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Тел.: **8 (499) 943-94-53**
E-mail: **vestnikfinu@mail.ru**
Сайт: **financetp.fa.ru**

Оформление подписки
в редакции
по тел.: **8 (499) 943-94-31**
e-mail: **MMKorigova@fa.ru**
Коригова М.М.

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Editorial address:
53, Leningradsky prospekt, office 5.4
Moscow, 125993
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Subscription in editorial office
tel: **8 (499) 943-94-31**
e-mail: **MMKorigova@fa.ru**
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Assessing the Effectiveness of Monetary Policy of Central Banks

G.G. Gospodarchuk[a] ✉, **E.S. Zeleneva**[b]
[a] Lobachevsky State University of Nizhni Novgorod, Nizhny Novgorod, Russia;
[b] Financial University, Moscow, Russia
[a] https://orcid.org/0000-0003-3660-6779; [b] https://orcid.org/0000-0003-0892-6070
✉ Corresponding author

ABSTRACT

Monitoring the effectiveness of the monetary policy of central banks is a crucial factor in the strategic management of the monetary sphere, not only at the national but also at the global level of the economy. Therefore, improving the methodological tools for this monitoring is of both scientific and practical interest, which determines the **relevance** of the research topic. The study **aims** to develop methodological tools to conduct a quantitative and qualitative assessment of the effectiveness of the monetary policy of central banks. The work uses a targeted **approach** to determining the effectiveness of the monetary policy, as well as **methods** of systemic-structural, comparative economic and GAP analysis. The empirical analysis of the effectiveness of the monetary policy in several countries for the period of 2014–2019 relies on the data of the World Bank and the Bank of Russia. **The novelty of the study** is in the targeted approach to the analysis and assessment of effectiveness. This approach is based on the specific features of strategic management of monetary circulation, which allows for a comprehensive objective assessment of the effectiveness regardless of the variety of strategic objectives of monetary policy and their development mechanisms in different countries. The study **resulted** in the methodology for quantitative assessment of monetary policy effectiveness and the criteria for qualitative evaluation of the analyzed effectiveness. The authors made **conclusions** regarding changes in the effectiveness of monetary policy in different countries, identified trends in the effectiveness of the monetary policy of the Bank of Russia, and revealed imbalances in its effectiveness at the level of federal districts. The results of the study confirmed the applicability and practical significance of the developed tools for analyzing and assessing the effectiveness of the monetary policy of central banks. By their means, international and national organizations will manage to identify best practices to implement monetary policy and recommend them for countries with low effectiveness of strategic management of monetary circulation.

Keywords: monetary policy; price stability; inflation targeting; effectiveness; monetary circulation; strategic management

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INTRODUCTION

Monetary policy by central banks has long been a very important research topic. Most of them aim at creating theories of monetary policy, models or algorithms for central banks.

Today, there are several basic theories that establish the objectives of monetary policy and methods to achieve these goals. For example, [1, 2] provide a review of these theories. There about 10 main theories and their modifications. The analysis of these theories indicates their weaknesses, as well as fundamental problems that call into question the fundamental possibility of applying these theories in practice. These problems include:

1. A limited set of monetary policy models. There are only two main dependent variables in the models: the value of the money supply and the market rate. In the first case, the central bank monitors the volume of money supply in circulation and maintains it at the planned level. The interest rate here is based on market mechanisms that ensure a balance between the demand and supply of money. Alternatively, the target is the interest rate, and the money supply is at a level ensuring equilibrium in the money market for a given rate. Thus, the choice of one of the two dependent variables, in fact, comes down to the choice of the style of money management between directive and indirect.

2. Problems with the exchange rate targeting are due to the fact that the rates of national currencies depend on the monetary policies of other countries. Therefore, targeting exchange rates leads to the fact that the country's monetary policy falls under the influence of monetary policy and the economy of other countries and can harm national interests.

3. Difficulties with planning the required volume of money supply with directive control of its value. First, it is quite difficult to predict the velocity of money circulation. Second, it is difficult to calculate the future volume of transactions that should serve money circulation. Third, in the modern economy, a significant portion of money circulates in the financial sector, which creates additional demand for money. This sector is dynamic and poorly forecasted.

4. Problems with determining the target interest rate are as follows. First, the formulas for setting interest rate targets are very complex, especially their modern options. Second, the structure of interest rates is diverse, while the formulas specify only one of the rates. Third, the central bank can issue loans at a rate different from the key one. It follows that the recommendations for rate targeting are far enough from practical use. Decisions on the level of rates are actually made by central banks not by formulas, but by voting depending on side effects.

5. Problems with inflation targeting. The main problem in the practical implementation of this monetary policy regime is that overall inflation is the sum of two factors. The first is monetary inflation, which can be controlled by the central bank. The second factor is non-monetary inflation, which is outside the central bank's area of responsibility and is not fully controlled by the instruments it has. Thus, with a change in the money supply, non-monetary inflation will, to some extent, compensate for monetary inflation, making the results of inflation targeting policy unpredictable.

The considered problems of the practical implementation of management models in monetary circulation indicate that implementing monetary policy based on certain theoretical approaches is unreliable regarding the result. One should develop a methodological toolkit to measure the effectiveness of monetary policy both in quantitative and qualitative aspects. This was the motivation for the present study.

The research includes several sections. The first section reviews publications dealing with theoretical and methodological aspects of the problem. The second section describes the developed indicators and criteria for analyzing and assessing the effectiveness of

monetary policy of central banks. The third section applies the developed methodological tools to the analysis and assessment of the effectiveness of monetary policy in some countries of the world, including the Russian Federation. The last section contains the main findings.

LITERATURE REVIEW

Systematization and generalization of scientific and special literature on the research topic show the three main directions of analysis and assessment of the effectiveness of monetary policy.

The first direction determines the effectiveness of a monetary policy by its influence on the country's economy. Effective monetary policy is believed to lead to economic growth and development, lower unemployment, slower inflation, and increased economic and financial stability.

E. Alaoui et al. [3] investigated the effectiveness of monetary policy in terms of the relationship between monetary policy variables and macroeconomic variables and found that these relationships have heterogeneous trends at different time scales. They concluded that the effectiveness of Islamic monetary policy depends more on the amount of money, and not on the interest rate. Similar conclusions were made by L. Fan, Y. Yu and C. Zhang [4]. The authors found that the money supply has a great influence on future inflation rates and real output, while official interest rates do not influence these factors.

Fujiwara [5] conducted a study of the effect of zero nominal interest rate on the structural output gap in Japan. The results of this study showed that excessive easing of monetary policy can lead to a structural gap in output.

M. Bluhm analyzed the strategies of the Bundesbank [6] and concluded that, a distinctive feature of the Bundesbank's strategy since 1975 has been its focus on the growth of monetary aggregates, as well as real economic activity and inflation dynamics.

Summarizing the results of scientific research in this area, we note that they have a number of controversial points.

First, the concept of the effectiveness of monetary policy is replaced by the concept of the effectiveness of economic policy.

Second, the state of the economy is influenced by many non- monetary factors. It is difficult to separate this influence.

Third, the impact of monetary policy on macroeconomic indicators can be multidirectional. For example, the implementation of a stimulating monetary policy can have a positive effect on employment and economic growth, but a negative one on inflation and the state of the balance of payments.

Fourth, sensitivity of macroeconomic indicators to changes in monetary policy is not unambiguous. This is supported by various, sometimes contradictory, findings from scientific research.

According to the second direction, the effectiveness of monetary policy shows up in the high conductivity of the transmission mechanism channels [7–9] and the effectiveness of individual monetary instruments.

For example, the Bank of Russia identifies the following channels of the transmission mechanism: interest rate, credit, balance sheet, currency and information (inflation expectations channel) as the most significant, as well as the channel of welfare, cash flows and risk taking as less significant.[1] The authors of scientific publications (for example, [10, 11]) limit the assessment of the effectiveness of the monetary policy of the Bank of Russia to the analysis of one or several channels, without the complete examination of the transmission mechanism. In particular, E. S. Fedorovskaya and D.V. Burakov [10] estimated the conductivity

[1] Guidelines for the Single State Monetary Policy for 2020–2022. Bank of Russia. 2019. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf (accessed on 10.11.2020).

of the credit channel of the monetary policy transmission mechanism of the Bank of Russia using the vector autoregression model. Based on the results, the authors formulated recommendations for improving the effectiveness of monetary policy in Russia as a whole. A similar study was conducted by E.S. Fedorovskaya [12] for the percentage channel.

The issues of conducting the transmission mechanism channels are described in the publications by foreign authors. M. Hossain and W.F. Ibon [13] used an assessment of the conductance of various transmission channels to analyze the effectiveness of monetary policy in Bangladesh.

P.L. Siklosa and M.T. Bohlb [14] assessed the effectiveness of monetary policy in Germany by analyzing the impact of Bundesbank communications and interest rates on inflation, while E.D. Naiborhu [9] assessed the effectiveness of the credit channel of the transmission mechanism of monetary policy in Indonesia by simulating the growth of bank credit depending on monetary policy shocks.

M. Were et al. [7] assessed the effectiveness of monetary policy in Kenya based on modeling the interest rate and credit channels of the transmission mechanism. The authors assessed the transfer of momentum from interest rates to inflation and aggregate demand.

G. Lopez-Buenache [8] investigated the evolution of the transmission mechanism of monetary policy in the United States after the Great Recession by assessing the economy's sensitivity to monetary policy shocks.

The effectiveness of the impact of interest rates on inflation in South Africa was examined by A. Iddrisu and I.P. Alagidede [15]. The authors assessed the conductivity of the interest rate and credit channel of the transmission mechanism of monetary policy using a vector autoregression model.

The effectiveness of monetary policy through the effectiveness of monetary instruments is also represented in the works by both Russian and foreign authors. For instance, O.V. Gordyachkova and E.V. Romanova [16] investigated the impact of various instruments of monetary policy on inflation, M2 money supply and exchange rate.

Yu.V. Vsyakikh and M.A. Kochergin [11] assessed the effectiveness of monetary policy by finding a correlation between the key rate and inflation.

K. Primus [17] compared the effectiveness of direct and indirect instruments of monetary policy in Barbados, Jamaica, and Trinidad and Tobago. The author concluded that central banks in small open economies should consider using reserve requirements as an adjunct to interest rate policies to achieve their macroeconomic goals.

To sum up, we note that the effectiveness of one or more channels of the transmission mechanism means the effectiveness of the transmission mechanism itself, and not monetary policy as a whole. The correlation of the monetary instrument and the target of monetary policy implies the possibility of achieving the set goal using this instrument, but does not always mean that the goal will be achieved only through this instrument.

The third area of research is methods and tools for analyzing and assessing the effectiveness of monetary policy of central banks.

Within this direction S.E. Dubova and S.V. Kuznetsova [18] developed a methodology for quantitative and qualitative assessment of the effectiveness of monetary policy using direct and indirect calculation methods. The direct method is determining the integral indicator, calculated by the point-weighted method, based on the need, target and economic effectiveness of the monetary policy. The goals of monetary policy are linked to macroeconomic goals that reflect the needs of the economy, and the dynamics of macroeconomic indicators is considered as criteria for the effectiveness of monetary policy. An indirect way is to

assess the effectiveness of monetary policy through the ratio of goals achieved to unattained goals.

Yu. Yu. Platonov and A.A. Terekhova [19] assess the effectiveness of monetary policy using indicators of the dynamics of the exchange rate, consumer price index and money supply. A similar approach based on dynamics indicators is used by P.V. Antonov and O.O. Zlobin [20]. They propose to assess the effectiveness of the monetary system by calculating and analyzing the dynamics of the credit and bank multiplier, as well as the monetization coefficient.

A. Tikhonov and A. Levenkov [21] use deviations of the GDP output gap, inflation rates, current account balance as a percentage of GDP, the ratio of the M3 aggregate to GDP and the systemic risk index from their average values in assessing the effectiveness of monetary policy [21]. The authors recommend assessing the effectiveness of a monetary policy based on a complex indicator, which includes particular indicators, normalized based on their standard deviations.

C. Pattipeilohy et al. [22] propose to use three-month interest rates to analyze monetary policy, which have a significant effect on the profitability of financial instruments, inflation and the output gap.

Generalization and systematization of publications in this area allows us to make the following conclusions.

First, the analysis and assessment of the effectiveness of monetary policy is based on the use of integral performance indicators calculated by the point-weighted method, which introduces an element of subjectivity in the calculation results.

Second, the analysis of effectiveness is suggested based on the methods designed to analyze trends in macroeconomic indicators and their stability, which does not correspond to the methodology of strategic management of the monetary sphere.

In general, the analysis of publications within all these areas helps identify the following main shortcomings in assessing the effectiveness of monetary policy of central banks:

- identification of the goals of monetary policy with the goals of economic policy;
- replacement of the concept of effectiveness of monetary policy with the concepts of effectiveness of the transmission mechanism and the effectiveness of monetary instruments;
- lack of methodological tools for assessing the effectiveness of monetary policy from the standpoint of strategic management in monetary circulation, followed by central banks.

Therefore, this study aims to develop scientifically based and easy-to-use methodological tools to conduct a quantitative and qualitative assessment of the effectiveness of the monetary policy of central banks in the context of strategic management in monetary circulation.

RESEARCH METHODOLOGY

Unlike the definitions of business effectiveness, based mainly on the ratio of results and costs, the methodology for analyzing and assessing the effectiveness of monetary policy from the standpoint of strategic management in monetary circulation has a pronounced specificity. This specificity is due to the fact that policy is an element of management, and management effectiveness is the ability to create goals and mechanisms to achieve these goals. From this point of view, the use of the targeted approach makes the most sense comparing to approaches based on the dynamics of macroeconomic indicators or on the assessment of the effectiveness of individual channels and instruments of the transmission mechanism.

Applying the target approach involves selecting targets and establishing their target values for the future (as a rule, for the medium term), as well as comparing these target (planned) values with the actual level achieved.

Choosing targets for monetary policy is defining its regime. Currently, we define the following monetary policy regimes:

1. Inflation targeting aimed at price stability.[2] Here, the most important task is to select an inflation indicator and to determine its target level. Most countries use the consumer price index (CPI) as an inflation indicator, which includes the prices of a wide range of goods and services. The choice of this indicator as a target is due to the fact that, although the base consumer price index is less volatile and more susceptible to the influence of monetary policy measures, the consumer price index better characterizes the change in the cost of living, and its dynamics affects the formation of inflationary expectations of economic entities.

2. Exchange rate targeting implies stabilization of the national currency rate in relation to the currencies of other countries. The exchange rate of the national currency is supported by means of foreign exchange interventions by the central bank to achieve a certain price ratio in the domestic and foreign markets [23].

3. Money targeting means setting medium-term goals in the form of monetary aggregate values. It is acceptable in the case of a high proportion of monetary components in the structure of factors of economic and financial development of the state [24].

4. Nominal GDP targeting based on indicators of real GDP and inflation [25]. The main advantage of this regime is the ability to monitor macroeconomic indicators and the implementation of monetary policy according to the results of economic monitoring. Under the nominal GDP targeting, monetary policy should be consolidated with other types of economic policy to ensure economic growth.

5. Targeting credit implies establishing a target value of the volume of credit or an increase in the total mass of credit resources [26, 27].

6. Interest rate targeting means maintaining money market rates at a given level [28].

7. Targeting without an explicit nominal anchor [29] means that central banks, along with monetary ones, apply other regimes, for example, targeting employment, economic growth, etc.[3]

Today's most popular monetary policy regime is inflation targeting. It is used in 41 countries, accounting for more than a third of global GDP. It is used by the central banks of Australia, Brazil, Great Britain, Russia, Japan, and others. Moreover, the Eurozone and the United States, which have not officially introduced inflation targeting, also set medium-term inflation targets. Including them, the share of countries setting target values for inflation reaches 75% of global GDP.[4]

Due to the variety of regimes and goals of monetary policy, we propose the following developed models to determine its effectiveness:

$$E = 1 - \sqrt{\frac{Z_1^2 + Z_2^2 + \ldots + Z_n^2}{n}}, \qquad (1)$$

where: E is the index of the effectiveness of monetary policy;

Z is the indicator of deviation of the actual values of the target monetary policy indicator from its planned values, calculated for each target indicator by formula (2);

n is the number of monetary policy targets.

$$Z = \frac{F - P}{\max(P, \beta)}, \qquad (2)$$

[2] Central Bank of the Russian Federation. URL: https://cbr.ru/DKP/ (accessed on 10.11.2020).

[3] Statement on Longer-Run Goals and Monetary Policy Strategy. The Federal Reserve System. 2020. URL: https://www.federalreserve.gov/monetarypolicy/review-of-monetary-policy-strategy-tools-and-communications-statement-on-longer-run-goals-monetary-policy-strategy.htm (accessed on 25.10.2020).

[4] Guidelines for the Single State Monetary Policy for 2020–2022. Bank of Russia. 2019. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf (accessed on 10.11.2020).

where: F is the actual value of the monetary policy target indicator, %;

P is the planned value of the monetary policy target indicator, %;

β is the minimum value of target indicator P, determined by the measurement accuracy, %.

In models (1), (2), *Z* index can be either positive or negative. The sign of the indicator depends on the direction of the deviation. With no deviations $Z = 0$. Indicator *E* with no deviations from the plan is equal to 1, and it decreases with deviations. In theory, with large deviations from the plan, *E* can become less than zero, although in practice this situation looks anomalous. The square root is subtracted from one so that the highest effectiveness was 1, and the lowest one was 0.

In formula (2), β is used to adjust the target indicators whose target value is close or equal to zero. Since the planned value (*P*) of the target indicator (*Z*) is located in the denominator of formula (2), its value close or equal to zero will lead to an excessively strong influence of corresponding indicator *Z* on overall index *E*. It is better to use the measurement error as β indicator of the corresponding monetary policy target.

The scope of application of proposed models (1), (2) is limited by official quantitatively expressed goals of monetary policy. The quantitative expression of goals should be pointwise.

However, in fact, different options are used to quantify the objectives of monetary policy:

- specific (point) target value;
- target point with a range of permissible deviations;
- target range.

For example, the point value of the inflation target is set by the central banks of Great Britain — 2%, Sweden — 2%, Japan — 2%. To emphasize the impossibility to achieve a goal with high precision, some inflation targeting central banks choose a point with a tolerance range or a target range as the type of goal. In this case, the range of acceptable values reaches (±2 pp), and the target range is within ±4 pp.[5] For instance, a specific inflation target value with a range of acceptable deviations is used by the central banks of Russia (4±1.5)%, Canada (2±1)%, Turkey (5±2)%, India (4±2)%, Brazil (4.5±2)%. The target range is used by the central banks of Israel (1–3)%, Australia (2–3)%, South Africa (3–6)%, Jamaica (4–6)%.

Regarding establishing inflation targets as a target range, there arises a problem to choose a point value of inflation. This problem can be solved by using the midpoint of the range as the target point value.

Proposed models (1), (2) provide for only a quantitative assessment of the effectiveness of monetary policy. To obtain a qualitative characteristic of effectiveness, we have developed a special rating scale (*Table 1*).

The rating scale (*Table 1*) has five options for qualitative characteristics of the effectiveness of monetary policy: high, good, satisfactory, low, ineffective, as well as criteria that allow the quantitative assessment of the effectiveness of monetary policy to be attributed to a particular qualitative level. The ranges of qualitative characteristics were created by dividing the maximum value of the quantitative assessment of the effectiveness of monetary policy ($E = 100\%$) into 4 equal parts.

RESULTS

The developed methodological toolkit was used to assess the effectiveness of monetary policy in developing (Russia, India, Brazil, Turkey) and developed (Sweden, Canada, Great Britain and Japan) countries[6] for 2014–2019. *Appendices 1* and *2* provide the initial data for calculating the effectiveness of the monetary

[5] Guidelines for the Single State Monetary Policy for 2018–2020. Bank of Russia. 2018. URL: https://www.cbr.ru/Content/Document/File/48129 /on_2018(2019–2020).pdf (accessed on 10.11.2020); Guidelines for the Single State Monetary Policy for 2014–2016. Bank of Russia. 2013. URL: http://www.cbr.ru/content/document/file/87373/on_2014(2015–2016).pdf. (accessed on 10.11.2020); Guidelines for the Single State Monetary Policy for 2015–2017. Bank of Russia. 2015. URL: http://www.cbr.ru/content/document/file/87372/on_2015(2016–2017).pdf (accessed on 10.11.2020).

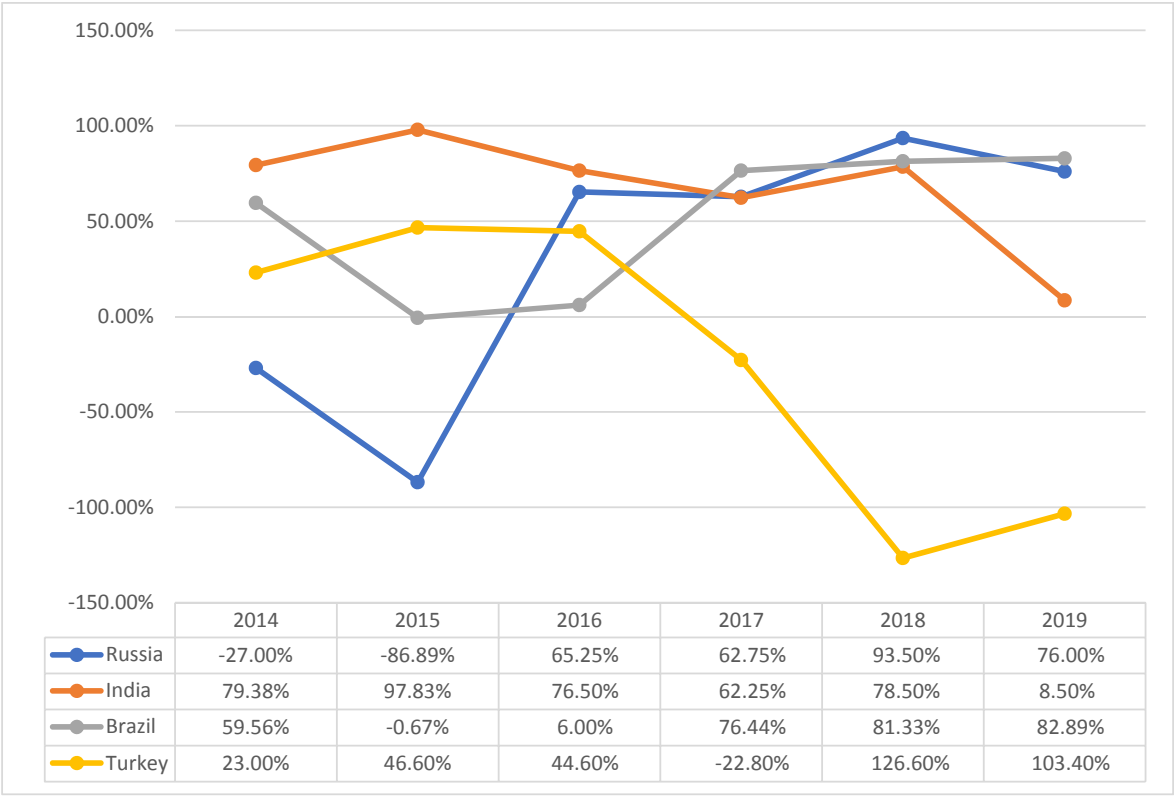
[6] IMF. URL: https://www.imf.org/external/index.htm (accessed on 25.10.2020).

Table 1

Scale of qualitative assessment of the effectiveness of monetary policy

Effectiveness levels of monetary policy	Criteria for the effectiveness of monetary policy, %
High	$75 < E \leqslant 100$
Good	$50 < E \leqslant 75$
Satisfactory	$25 < E \leqslant 50$
Low	$0 < E \leqslant 25$
Ineffective	$E \leqslant 0$

Source: compiled by the authors.



	2014	2015	2016	2017	2018	2019
Russia	-27.00%	-86.89%	65.25%	62.75%	93.50%	76.00%
India	79.38%	97.83%	76.50%	62.25%	78.50%	8.50%
Brazil	59.56%	-0.67%	6.00%	76.44%	81.33%	82.89%
Turkey	23.00%	46.60%	44.60%	-22.80%	126.60%	103.40%

Fig. 1. **Effectiveness of the monetary policy in Russia, India, Brazil and Turkey in 2014–2019**

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf; https://www.worldbank.org/ (accessed on 10.11.2020).

policy of these countries. The countries were chosen by the presence of quantitatively expressed goals in the monetary policy of their central banks. The analysis period was determined by the availability of the data used in the calculations. The calculation of the effectiveness of monetary policy was carried out using models (1), (2). β index was conventionally taken for 1.0%.

Fig. 1 shows the dynamics of the index of the effectiveness of monetary policy in developing countries.

Fig. 1 shows a decrease in the effectiveness of monetary policy in Russia and Brazil in

Table 2

Qualitative assessment of the effectiveness of the monetary policy in Russia, India, Brazil and Turkey in 2014–2019

	Russia	India	Brazil	Turkey
2014	Ineffective	High	Good	Low
2015	Ineffective	High	Ineffective	Satisfactory
2016	Good	High	Low	Satisfactory
2017	Good	Good	High	Ineffective
2018	High	High	High	Ineffective
2019	High	Low	High	Ineffective

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020 (2021–2022).pdf; https://www.worldbank.org/ (accessed on 10.11.2020).

2015, caused by the fall in energy prices and the devaluation of the national currency. Later, as the negative influence of external factors decreased and the decisions of central banks on stabilizing prices were implemented, the effectiveness of monetary policy in these countries began to increase and reached a high level by the end of the period *(Table 2)*.

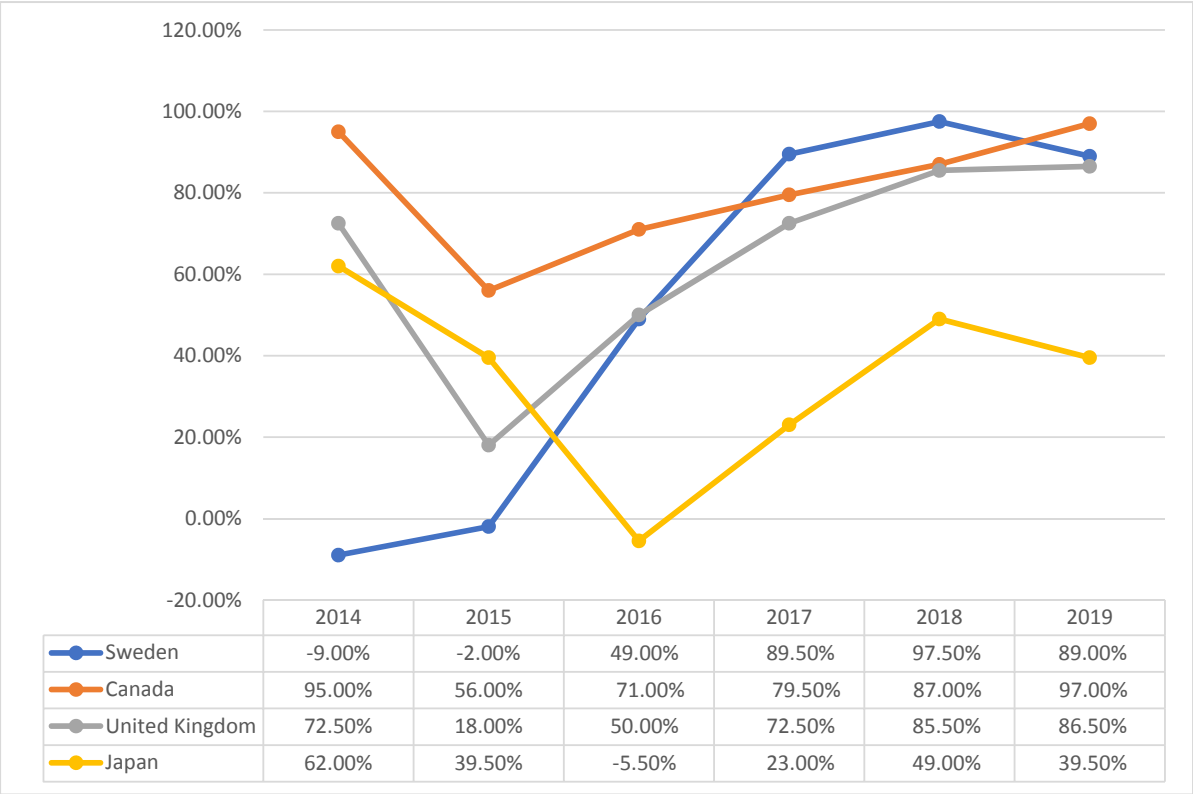
India and Turkey showed the opposite dynamics. In India, the effectiveness index remained at a good and high level until 2019. This is due to the fact that in 2014, India just started to make the transition to the inflation targeting regime and outlined realistic targets to achieve the inflation target: 8% for 2014, 6% for 2015 and 4% for 2016.[7] A flexible approach to monetary policy goals made it possible to keep inflation close to the established target values. However, in 2019, the Bank of India's monetary policy effectiveness index dropped to 8.5%. This was due to heavy rains that destroyed a significant part of the crop. The weather conditions provoked a sharp rise in retail prices, which could not be held by monetary instruments.

In Turkey, the effectiveness index of monetary policy was low throughout the analyzed period. Due to a sharp decline in 2016, it went into the negative zone. The effectiveness index reached its minimum value in 2018. The maximum deviation of the actual inflation values from the target level took place in October 2018 (about 20 p.p.). The reasons for the significant acceleration of inflation in 2018 were both external and internal factors. In particular, in August 2018, there was a sharp weakening of the lira (in 2018, its exchange rate fell by 40%) amid the trade conflict with the United States and capital outflow from emerging markets.

Fig. 2 shows the dynamics of the effectiveness index of monetary policy in developed countries.

The graphical analysis (*Fig. 2*) shows a decline in the effectiveness of monetary policy in 2015, followed by its recovery in Canada, the United Kingdom and Japan. The low effectiveness of monetary policy in these countries was associated not with high inflation, as in developing countries, but, on

[7] Report of the Expert Committee to Revise and Strengthen the Monetary Policy Framework. Reserve Bank of India. 2014. URL: https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx? UrlPage=&ID=743 (accessed on 10.11.2020).



	2014	2015	2016	2017	2018	2019
Sweden	-9.00%	-2.00%	49.00%	89.50%	97.50%	89.00%
Canada	95.00%	56.00%	71.00%	79.50%	87.00%	97.00%
United Kingdom	72.50%	18.00%	50.00%	72.50%	85.50%	86.50%
Japan	62.00%	39.50%	-5.50%	23.00%	49.00%	39.50%

Fig. 2. **Effectiveness of the monetary policy in Sweden, Canada, the UK and Japan in 2014–2019**

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf; https://www.worldbank.org/ (accessed on 10.11.2020).

Table 3

Qualitative assessment of the effectiveness of the monetary policy in Sweden, Canada, Great Britain and Japan in 2014–2019

	Sweden	Canada	UK	Japan
2014	Ineffective	High	Good	Good
2015	Ineffective	Good	Low	Satisfactory
2016	Satisfactory	Good	Satisfactory	Ineffective
2017	High	High	Good	Low
2018	High	High	High	Satisfactory
2019	High	High	High	Satisfactory

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf; https://www.worldbank.org/ (accessed on 10.11.2020).

Table 4

Territorial differentiation of the effectiveness of the monetary policy of the Bank of Russia in 2019

Indicator	Central Federal District	Northwestern Federal District	Southern Federal District	North Caucasian Federal District	Volga Federal District	Ural Federal District	Siberian Federal District	Far Eastern Federal District
Inflation target	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Actual inflation	3.0	3.0	2.7	3.2	2.7	3.1	3.6	3.9
Monetary policy effectiveness index	0.75	0.75	0.68	0.80	0.68	0.78	0.90	0.98
Monetary policy effectiveness level	Good	Good	Good	High	Good	High	High	High

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020 (2021–2022).pdf (accessed on 10.11.2020).

the contrary, with excessively low growth rates of consumer prices and even deflation. For example, in Japan, inflation remained below 1% from 2015 to 2019, with a target of 2%. Against the general background, there is a steady growth in the Bank of Sweden's monetary policy effectiveness index, which, from negative values at the beginning of the analyzed period, managed to reach a high level in 2017. The effectiveness of the Bank of Japan's monetary policy, on the contrary, decreased from "Good" in 2014 to "Low" in 2017 (*Table 3*). In subsequent years, the Bank of Japan's monetary policy effectiveness index began to rise slowly, but in 2019 it did not manage to reach the 2014 level.

The comparative analysis of the effectiveness of monetary policy in developed and developing countries shows that the best results in 2019 were achieved by Canada — 97.0%, Sweden — 89.0%, Great Britain — 86.5%, Brazil — 82, 89%, and Russia — 76.0%. These indicators demonstrate the best practices in implementing monetary policy, therefore, they require careful consideration with a view to further replication in countries with a low level of effectiveness of strategic management in monetary circulation.

Thus, the proposed methodological toolkit, designed to analyze and evaluate the effectiveness of monetary policy in different countries, can be used for the same purposes within countries in the context of their territorial entities. Applying these tools to the analysis of the effectiveness of the monetary policy of the Bank of Russia in the context of federal districts made it possible to identify territorial imbalances in achievement of inflation targets (*Table 4*).

Table 4 shows that in 2019, the Far Eastern Federal District achieved the best effectiveness indicators of monetary policy. This was facilitated by government measures aimed at developing the economy of this district. The implementation of government support measures led to an increase in lending activity in the real sector of the economy and an increase in effective demand

for goods and services at a faster pace than in other districts.

Less significant results were shown by the Southern and Volga Federal Districts. Despite the fact that the effectiveness of monetary policy in these districts was good, an increase in the monetary policy effectiveness index there would make it possible to raise the effectiveness of the monetary policy of the Bank of Russia on a national scale.

CONCLUSIONS

Monitoring the effectiveness of monetary policy of central banks plays an important role in the strategic management in monetary circulation. Improving the assessment of the effectiveness of monetary policy is of both scientific and practical interest. However, the analysis of scientific research revealed the lack of methodological tools that would allow assessing the effectiveness of monetary policy from the standpoint of strategic management of the monetary sphere, which is followed by central banks.

In this regard, the study aimed to develop scientifically grounded and easy-to-use methodological tools to conduct an objective quantitative and qualitative characteristic of the effectiveness of monetary policy of central banks in the context of strategic management in monetary circulation.

We developed a method for quantifying the effectiveness of the monetary policy based on the calculation of the effectiveness index. The effectiveness index is an integral indicator that includes private effectiveness indices corresponding to individual monetary policy objectives. We also developed criteria for a qualitative assessment of the effectiveness of the monetary policy of central banks, which make it possible to group countries and their territorial entities by levels of effectiveness. Thus, the study develops the theory and methodology of the effectiveness of management systems when choosing criteria and methods for the overall assessment of the effectiveness of monetary management.

The novelty of the study is in the targeted approach to the analysis and assessment of effectiveness of monetary policy of central banks, corresponding to the methodology of strategic management in monetary circulation. This approach involves selecting targets and establishing their future target values, as well as comparing these target (planned) values with the actually achieved level. This approach makes it possible to obtain a comprehensive objective assessment of effectiveness, regardless of the variety of strategic goals of monetary policy and their development mechanisms in different countries.

Based on a targeted approach, the methodological toolkit is objective, since it relies on official data from central banks, international financial organizations and statistics bodies in the public domain. For the same reason, it becomes available for analytical use by a wide range of stakeholders.

In general, the results of the empirical study confirmed the applicability of the developed tools for analyzing and assessing the effectiveness of monetary policy of central banks. If used at the global and national levels of monetary management, it will allow for identifying the best practices in implementing monetary policy and recommending them in countries with low effectiveness of strategic monetary management.

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REFERENCES

1. Taylor J. B. Monetary Policy Rules. National Beraeu of Economic Research. 1999; 460 p.
2. Moiseev S. R. Rules for monetary policy. *Finance and credit*, 2002;(16):37–46. (In Russ.).
3. Alaoui E., Jusoh A. O., Yussof H. B., Hanifa S. A., Hisham M. Evaluation of monetary policy: Evidence of the role of money from Malaysia. *The Quarterly Review of Economics and Finance.* 2019;74:119–128. DOI: 10.1016/J.QREF.2019.04.005
4. Fan L., Yu Y., Zhang C. An empirical evaluation of China's monetary policies. *Journal of Macroeconomics*. 2011;33(2):358–371. DOI: 10.1016/j.jmacro.2010.11.003
5. Fujiwara I. Evaluating monetary policy when nominal interest rates are almost zero. *Journal of the Japanese and International Economies*. 2006;20(3):434–453. DOI: 10.1016/j.jjie.2006.02.001
6. Bluhm M. Investigating the Monetary Policy of Central Banks with Assessment Indicators. CFS Working Paper Series. 2011; 38 p. DOI: 10.2139/ssrn.1924180
7. Were M., Kamau A. W., Sichei M. Assessing the effectiveness of monetary policy in Kenya: Evidence from a macroeconomic model. *Economic Modelling*. 2014;37:193–201. DOI: 10.1016/j.econmod.2013.11.004
8. Lopez-Buenache G. The evolution of monetary policy effectiveness under macroeconomic instability. *Economic Modelling*. 2019;83:221–233. DOI: 10.1016/j.econmod.2019.02.012
9. Naiborhu E. D. The lending channel of monetary policy in Indonesia. *Journal of Asian Economics*. 2020;67(C). DOI: 10.1016/j.asieco.2020.101175
10. Fedorovskaya E. S., Burakov D. V. Evaluation of the effectiveness of the monetary policy of the Bank of Russia on the basis of the analysis of the conductivity of the transmission credit channel. *Internet-zhurnal Naukovedenie*. 2017;9(4). (In Russ.).
11. Vsyakih Yu.V., Kochergin M. A. Performance evaluation of monetary policy of the Central bank in the context of geopolitical instability. *Vestnik Belgorodskogo gosudarstvennogo tekhnologicheskogo universiteta im. V.G. SHuhova.* 2015;(5):269–274. (In Russ.).
12. Fedorovskaya E. S. Evaluation of the effectiveness of the monetary policy of the CBR on the basis of the analysis of the conductivity of the interest transmission channel. *Upravlenie ekonomicheskimi sistemami: elektronnyj nauchnyj zhurnal.* 2017;(7). (In Russ.).
13. Hossain M., Ibon M. W.F. Assessing the Effectiveness of Monetary Policy in Bangladesh. In: Hossain M. (eds.) *Bangladesh's Macroeconomic Policy*. Singapore, Singapore: Palgrave Macmillan; 2020. p.135–162. DOI: 10.1007/978–981–15–1244–5_5
14. Siklosa P. L., Bohlb M. T. Do actions speak louder than words? Evaluating monetary policy at the Bundesbank. *Journal of Macroeconomics*. 2007;29(2):368–386. DOI: 10.1016/j.jmacro.2005.08.002
15. Iddrisu A., Alagidede I. P. Revisiting interest rate and lending channels of monetary policy transmission in the light of theoretical prescriptions. *Central Bank Review*. 2020. DOI: 10.1016/j.cbrev.2020.09.002
16. Gordyachkova O. V., Romanova E. V. The effectiveness of monetary policy of the Central bank of the Russian Federation: theoretical and practical aspects of the problem. *Ekonomika i predprinimatel'stvo*. 2017;5–1(82):244–249. (In Russ.).
17. Primus K. The effectiveness of monetary policy in small open economies. *Journal of Policy Modeling*. 2018;40(5):903–933. DOI: 10.1016/j.jpolmod.2018.03.001
18. Dubova S. E., Kuznetsova S. V. Methods of estimation of effectiveness of the Central bank monetary policy. *Izvestiya vysshih uchebnyh zavedenij. Seriya: Ekonomika, finansy i upravlenie proizvodstvom*. 2011;(4):6–13. (In Russ.).
19. Platonova Yu. Yu., Terekhova A. A. Evaluation of an efficiency of the monetary policy in Russian Federation *Ekonomika i predprinimatel'stvo*. 2016;(3–2):123–127. (In Russ.).
20. Antonov P. V., Zlobina O. O. Evaluating the efficiency of the monetary system of the Russian Federation. *Finansy i kredit = Finance and Credit*. 2015;21(27):25–34. (In Russ.).

21. Tikhonov A., Leviankou A. The effectiveness of monetary policy: a methodological approach, methods, the results of testing. *Bankovskij vestnik*. 2019;(3):11–15. (In Russ.).
22. Pattipeilohy C., Bräuning C., Willem van den End J., Maas E. *Assessing the effective stance of monetary policy: A factor-based approach*. De Nederlandsche Bank. Working Paper. No. 575. 2017. URL: https://www.dnb.nl/binaries/Working%20Paper%20No.%20575_tcm46–365411.pdf
23. Moiseev S., Pantina I. Real exchange rate targeting. *Voprosy ekonomiki*. 2016;(5):44–65. (In Russ.). DOI: 10.32609/0042–8736–2016–5–44–65
24. Rogatenyuk E.V. Comparative characteristics of implementing monetary policy modes (targeting regimes). *Ekonomika stroitel'stva i prirodopol'zovaniya*. 2017;(3):67–73. (In Russ.).
25. Taylor J.B. What would nominal GNP targeting do to the business cycle? *Carnegie-Rochester Conference Series on Public Policy, Elsevier*. 1985;22(1):61–84. DOI: 10.1016/0167–2231(85)90027–2
26. Burakov D.V. Managing cyclical movements of credit. Moscow: Rusajns; 2015. 288 c. (In Russ.).
27. Vera-Cossio D.A. *Targeting credit through community*. Inter-American Development Bank. Department of Research and Chief Economist. Discussion paper № IDB-DP-609. August 2018. DOI: http://dx.doi.org/10.18235/0001268
28. Kobayashi T. Monetary policy uncertainty and interest rate targeting. *Journal of Macroeconomics*. 2004;26(4):725–735. DOI: 10.1016/j.jmacro.2003.06.004
29. Drobyshevskij S.M., Evdokimova T.V., Trunin P.V. Impact of the choice of goals and policy instruments of monetary authorities on the vulnerability of economies. Moscow: Delo; 2012. 201 c. (In Russ.).

Appendix 1

Source data for calculating the monetary policy effectiveness in developing countries

Russian Federation		
Year	Inflation target, %	Actual inflation, %
2014	5.00	11.35
2015	4.50	12.91
2016	4.00	5.39
2017	4.00	2.51
2018	4.00	4.26
2019	4.00	3.04
India		
Year	Inflation target, %	Actual inflation, %
2014	8.00	6.35
2015	6.00	5.87
2016	4.00	4.94
2017	4.00	2.49
2018	4.00	4.86
2019	4.00	7.66
Brasil		
Year	Inflation target, %	Actual inflation, %
2014	4.50	6.32
2015	4.50	9.03
2016	4.50	8.73
2017	4.50	3.44
2018	4.50	3.66
2019	4.50	3.73
Turkey		
Year	Inflation target, %	Actual inflation, %
2014	5.00	8.85
2015	5.00	7.67
2016	5.00	7.77
2017	5.00	11.14
2018	5.00	16.33
2019	5.00	15.17

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf; https://www.worldbank.org/ (accessed on 10.11.2020).

Appendix 2

Source data for calculating the monetary policy effectiveness in developed countries

Sweden		
Year	Inflation target, %	Actual inflation, %
2014	2.00	–0.18
2015	2.00	–0.04
2016	2.00	0.98
2017	2.00	1.79
2018	2.00	1.95
2019	2.00	1.78
Canada		
Year	Inflation target, %	Actual inflation, %
2014	2.00	1.90
2015	2.00	1.12
2016	2.00	1.42
2017	2.00	1.59
2018	2.00	2.26
2019	2.00	1.94
UK		
Year	Inflation target, %	Actual inflation, %
2014	2.00	1.45
2015	2.00	0.36
2016	2.00	1.00
2017	2.00	2.55
2018	2.00	2.29
2019	2.00	1.73
Japan		
Year	Inflation target, %	Actual inflation, %
2014	2.00	2.76
2015	2.00	0.79
2016	2.00	–0.11
2017	2.00	0.46
2018	2.00	0.98
2019	2.00	0.79

Source: compiled by the authors based on data from the Bank of Russia and the World Bank. URL: http://www.cbr.ru/content/document/file/87358/on_2020(2021–2022).pdf; https://www.worldbank.org/ (accessed on 10.11.2020).

ABOUT THE AUTHORS

Galina G. Gospodarchuk — Dr. Sci. (Econ.), Prof., Department of Finance and Credit, Lobachevsky State University of Nizhni Novgorod, Nizhny Novgorod, Russia
gosgg@yandex.ru

Elena S. Zeleneva — Postgraduate student, Department of Banking and Financial Markets, Intern Researcher, Research Center of Monetary Relations, Financial University, Moscow, Russia
eszeleneva@fa.ru

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ORIGINAL PAPER

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Does Intergovernmental Equalization Create Disincentives for Regional Infrastructural Development?

N.E. Barbashova
Institute for Applied Economic Research, Russian Academy of National Economy and Public Administration, Moscow, Russia; Financial Research Institute, Ministry of Finance of Russia, Moscow, Russia
http://orcid.org/0000-0003-1614-7368

ABSTRACT

The subject of the research is the relationship between the amount of fiscal equalization grants and the length of transport routes in the regions. The study **aims** to test the hypothesis that the current formula for intergovernmental equalization creates disincentives for developing the road network in the regions. **The relevance** of the study is due to the fact that equalizing interterritorial inequality and regional infrastructural development are the most important goals of regional policy, whose instruments should not contradict. The current formula for distributing fiscal equalization grants contains a negative relationship between the length of transport routes in the regions and the amount of the transfer. That is, with an increase in the length of roads, the amount of grants to regions with initially low transport accessibility decreases. The author used **the method** of simulation modeling to quantify the reduction in grants to regions with low transport accessibility in the case of an increase in the length of roads in 2020 and to assess the potential impact of this decrease on the policy of regional authorities. As a **result**, the author revealed that while maintaining the current dynamics of road construction, an increase in the length of transport routes will lead to a decrease in the volume of grants to regions within 1%, which is insignificant regarding incentives. However, with an increase in the road network of hard-to-reach regions by one and a half times or more, this decrease may become critical. The work provides the estimate of the minimum additional fiscal revenue required to compensate for the lost income of the region with an increase in the length of transport routes. A **further** study may provide more details on the impact of the road industry development on the own revenues of regional budgets.

Keywords: intergovernmental equalization; grants; regional development; transport accessibility; road construction; disincentives

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INTRODUCTION

Grants for intergovernmental equalization in the regions are the most significant element of the system of intergovernmental grants in the Russian Federation. The method of distributing equalizing grants considers many factors that objectively affect the differences in income opportunities and expenditure needs of territories. The aim of providing this transfer is to smooth out inter-territorial differences in the intergovernmental equalization of regions and in the availability of budgetary services for their population. In domestic and foreign scientific studies, they often ask if intergovernmental equalization does not conflict with stimulating the economic development of regions [1–3]. The answer is ambiguous, since the proportion between the volumes of equalizing and stimulating financial assistance is a matter of political choice and, as a rule, is established by means of "manual adjustment" based on both long-term national priorities and current challenges [1]. Most of the Russian studies show that, within the framework of the current method of distributing equalizing subsidies, the regions retain incentives to develop their own income base [4, 5]; the mechanism of intergovernmental equalization as a whole does not create dependency in the regions. The available works downplay individual parameters of the formula for distributing the equalizing transfer, which can potentially play the role of disincentives. This refers to indicators, whose value change leads to an increase in the amount of grants, but adversely affects the socio-economic development of the region as a whole. If the value of this indicator depends on the actions of the territorial authorities, then the latter may have incentives for ineffective behavior. This is called the "gaming effect" in the scientific literature [6]. In this context, the indicator that is used for distributing equalizing grants to compare the transport accessibility of territories, the length of roads and railways, should be analyzed in detail.

Considering the Spatial Development Strategy of the Russian Federation,[1] Decrees of the President of the Russian Federation No. 13 "On approval of the Fundamentals of the State Policy of Regional Development of the Russian Federation for the Period up to 2025" dated January 16, 2017 and No. 204 "On National Goals and Strategic Development Objectives Of the Russian Federation for the period up to 2024" dated May 7, 2018, infrastructural development of territories is especially urgent. In particular, the strategic documents pay great attention to road facilities, reconstruction and construction of the transport network. To solve the set tasks, a system of national projects and activities has been developed and appropriate financial support is provided. According to the current formula for distributing grants for intergovernmental equalization in the constituent entities of the Russian Federation, the development of the transport system in a number of regions and an increase in the length of roads and railways can lead to a decrease in assessing the cost of budgetary services and, as a consequence, to a reduction of these grants. Thus, a conflict may arise between the goals of national policy — intergovernmental equalization and stimulation of territories with low transport accessibility, as a result, the regional authorities will lack motivation to develop the road sector. On the other hand, disincentives may be insignificant and may not affect political decisions at the sub-federal level. Assessing this problem requires appropriate calculations. The results will allow to conclude if there are any disincentives for infrastructure development in the current methodology for intergovernmental equalization of regions.

THE DETAILS OF TRANSPORT ROUTES IN THE CURRENT FORMULA OF INTERGOVERNMENTAL EQUALIZATION

Transport accessibility is an important factor that determines the differences in the cost

[1] Spatial development strategy of the Russian Federation for the period up to 2025. Approved by the order of the Government of the Russian Federation dated 13.02.2019 No. 207-r.

of budget services in different regions. The absence or poor quality of the road network and transport infrastructure creates additional costs and increases expenditure obligations of the budget sector. Indicators of transport accessibility are used when assessing the expenditures of territories for the purpose of intergovernmental regulation in the USA and Canada [7], Australia, Switzerland, Spain, India [8].

We will now look at how the coefficient of transport accessibility is considered in the current Russian method of distributing grants to equalize the budgetary provision of regions.[2]

The volume of equalizing grants of a constituent entity of the Russian Federation depends on the ratio of the tax potential index (an indicator that measures differences in the income opportunities of territories per capita) and the budget expenditures index (an indicator that measures intergovernmental differences in specific expenditure requirements). The budget expenditure index is calculated as the weighted average sum of the indices of wages, the cost of housing and communal services and prices, with the last two components additionally indexed by the indicator (1 + TAC), where TAC is the transport accessibility coefficient. The transport accessibility coefficient for the *i*-th region is calculated by formula (1):

$$T_i^{AC} = \left(3 - 2 * \frac{D_i}{D_{ave}}\right) * \left(1 + \frac{R_i}{R_{ave}}\right) * N_i^{REM}, \quad (1)$$

where D_i and D_{ave} are the density of permanent transport routes (railways and paved roads) in the *i*-th constituent entity of the Russian Federation and on average throughout the country, respectively, at the end of the last reporting year;

N_i^{REM} is the proportion of the population in the *i*-th constituent entity of the Russian Federation that lives in areas with limited periods of delivery of goods and in mountainous areas, in the resident population of this constituent entity at the end of the last reporting year; at the same time, an additional cost weighting factor of 0.5 is applied to the population of the region living in mountainous regions, and a weighting factor of 1.2 is applied to the population living in areas with limited delivery times;

R_i and R_{ave} is the share of rural settlements that have no connections on hard-surface roads and which are not provided with a connection with the nearest railway station, sea or river port, airport, in the *i*-th constituent entity of the Russian Federation and in the total number of rural settlements in national average, respectively, at the end of the last reporting year.

The ratio $\frac{R_i}{R_{ave}}$ is considered zero for all constituent entities of the Federation, except the regions where more than half of the population lives in areas with limited periods for the delivery of goods and in mountainous areas, and the share of rural settlements that have no connection by hard-surface roads and do not provided with communication with the nearest railway station, sea or river port, airport, in the total number of rural settlements is more than twice the national average.

The density of transport routes (D_i and D_{ave}) is calculated as the total length of permanent transport routes (railways and paved roads), referred to the area of the corresponding constituent entity of the Russian Federation. The maximum value of ratio $\frac{D_i}{D_{ave}}$ is limited to 1, i.e. in relation to

[2] The methodology was approved by the Decree of the Government of the Russian Federation of November 22, 2004 No. 670 "On the distribution of grants for equalizing the budgetary provision of the constituent entities of the Russian Federation".

regions with a density of permanent transport routes higher than the national average, this parameter in the formula for calculating the transport accessibility coefficient is considered to be 1.

To calculate the distribution of grants for equalizing budgetary provision to the constituent entities of the Russian Federation in 2020, the transport accessibility coefficient TAC is equal to 0 for 49 of 85 Russian regions.[3] TAC maximum value is in the Chukotka Autonomous District (9.640). *Table 1* shows the nonzero values of TAC in Russian regions in 2020.

EFFECT OF THE LENGTH OF THE ROAD NETWORK ON THE VOLUME OF EQUALIZING GRANTS TO REGIONS

We will now see how changes in the length of transport routes affect the amount of grants to regions.

Further analysis applies only to the part of the grants, which is determined based on the estimated level of budgetary provision, i.e. the ratio of the tax potential index and the budget expenditure index. We do not consider the compensatory part of the subsidy, which is distributed considering the previously approved volumes and established restrictions on the maximum reduction or increase in the size of the transfer. Also, the part of the grant that depends on the "model budget" is not considered. The estimate of expenditure obligations of the constituent entities, since the initial data for reproducing this calculation (registers of expenditure obligations of the constituent entities of the Russia and municipalities) are not available. In 2020, the amount distributed among the Russian regions based on the estimated budgetary provision amounted to 502,506,441 thousand roubles, which corresponds to 70% of the approved equalizing grant.

Our further calculations are based on a simulation model built in Microsoft Excel, which reproduces the distribution of grants for equalizing the budgetary provision of the constituent entities of the Russian Federation for 2020 in accordance with the initial data and distribution results posted on the official website of the Ministry of Finance of Russia.[4] We considered the effect of the increase in the length of railways and paved roads on the value of the equalizing grant of the constituent entities of the Russian Federation. The mechanism is as follows: an increase in the length of transport routes leads, in accordance with formula (1), to a decrease in TAC, which, in turn, leads to a decrease in the budget expenditures index. In other words, the methodology assumes that improving transport accessibility leads to a relative reduction in the cost of budget services, and as a result, to a decrease in the region's need for grants.

Note that the grant is sensitive to changes in the length of roads not for all regions with a nonzero transport accessibility coefficient. First, we can exclude donor regions that do not receive grants for equalizing budgetary provision. These are the Komi Republic, the Murmansk region, the Nenets Autonomous District, the Tyumen region, the Khanty-Mansi Autonomous District — Yugra, the Yamalo-Nenets Autonomous District, the Krasnoyarsk region, and the Sakhalin region. Second, an increase in the length of the road network will in no way affect the size of the transfer to regions where the density of transport routes is equal to or exceeds the average Russian one. According to *Table 1*, these subjects include the Republic of Karelia, all regions of the Southern and North Caucasian Federal Districts, the Perm region, the Chelyabinsk region, the Republic of Khakassia, the Altai region, the Kemerovo region — Kuzbass, the Primorsky Krai and the Jewish Autonomous District. For these regions, the transport accessibility coefficient is determined by other

[3] Ministry of Finance of Russia. URL: https://minfin.gov.ru/ru/perfomance/regions/mb/mb2020_2022/ (accessed on 08.10.2020).

[4] Ministry of Finance of Russia. URL: https://minfin.gov.ru/ru/perfomance/regions/mb/mb2020_2022/ (accessed on 08.10.2020).

Table 1

Values of the coefficient of transport accessibility and indicators of the length of transport routes of the constituent entities of the Russian Federation in 2020 (for regions with TAC > 0)

Constituent entity of the Russian Federation	Transport accessibility coefficient (TAC)	Length of railways and paved roads, km	Density of transport routes in average for Russia
Republic of Karelia	0.0138	14083	1.000
Republic of Komi	0.3862	9354	0.302
Arhangelsk region	0.2048	16490	0.537
Murmansk region	0.0680	4775	0.443
Nenets Autonomous District	3.5500	274	0.021
Republic of Adygea	0.0388	4916	1.000
Krasnodar region	0.0311	42839	1.000
Republic of Dagestan	0.1788	21695	1.000
Republic of Ingushetia	0.2166	3154	1.000
Kabardino-Balkar Republic	0.1264	8015	1.000
Karachay-Cherkess Republic	0.3290	5323	1.000
Republic of North Ossetia — Alania	0.1920	6539	1.000
Chechen Republic	0.0751	14566	1.000
Stavropol region	0.0495	22145	1.000
Perm region	0.0128	27029	1.000
Tyumen region	0.0476	15482	1.000
Chelyabinsk region	0.0006	24189	1.000
Khanty-Mansi Autonomous District — Yugra	0.2576	18533	0.466
Yamalo-Nenets Autonomous District	1.5806	7369	0.129
Altai Republic	0.8237	4590	0.664
Tyva Republic	0.3943	3598	0.287
Republic of Khakassia	0.0351	6706	1.000
Altai region	0.0067	38466	1.000
Krasnoyarsk region	0.4014	31138	0.177
Irkutsk region	0.0647	30320	0.526
Kemerovo region — Kuzbass	0.0011	20778	1.000
Tomsk region	0.4490	10331	0.442
Republic of Buryatia	0.4109	10765	0.412
Republic of Sakha (Yakutia)	3.1349	14046	0.061
Transbaikal region	0.2110	17536	0.664
Kamchatka Krai	3.7385	2144	0.287
Primorsky Krai	0.0764	17930	1.000
Khabarovsk region	0.3571	14850	0.253
Amur region	0.1885	15843	0.589
Magadan region	3.4062	2778	0.081
Sakhalin region	0.3417	3359	0.519
Jewish Autonomous District	0.3368	3010	1.000
Chukotka Autonomous District	9.6405	922	0.017

Source: Ministry of Finance of the Russian Federation. URL: https://minfin.gov.ru/ru/perfomance/regions/mb/mb2020_2022/ (accessed on 08.10.2020).

Table 2

Impact of changes in the road length of the constituent entities of the Russian Federation on the volume of equalizing grants in 2020 (for granted regions with the density of transport routes below the average in Russia)

Constituent entity of the Russian Federation	Grant amount, thousand roubles	Changes in grants with an increase in the length of roads by 1%, thousand roubles	Changes in grants with an increase in the length of roads by 100 km, thousand roubles
Arhangelsk region	4471062	–4971	–3015
Altai Republic	7370334	–27778	–60517
Tyva Republic	16303284	–4665	–12966
Irkutsk region	841950	–2543	–839
Tomsk region	3377051	–6472	–6265
Republic of Buryatia	17887968	–23093	–21452
Republic of Sakha (Yakutia)	44977512	–29877	–21271
Transbaikal region	6674538	–19832	–11310
Kamchatka Krai	33424354	–13557	–63224
Khabarovsk region	4184607	–3627	–2443
Amur region	2125712	–3580	–2260
Magadan region	1962071	–1451	–5224
Chukotka Autonomous District	8372845	–1906	–20658

Source: author's calculations based on a simulation model.

factors — first of all, the size of the population living in areas with a limited time for the delivery of goods and mountainous areas.

Table 2 shows the results of simulation calculations assessing the impact of an increase in the length of roads on the volume of equalizing transfer of the regions where this factor is significant.

The calculations show that the volume of the equalizing transfer is most sensitive to changes in the length of transport routes in such constituent entities of the Russian Federation as the Altai Republic, the Tyva Republic, the Republic of Buryatia, the Republic of Sakha (Yakutia), the Transbaikal region and the Kamchatka Krai.

The *Fig.* shows the visual results of the simulation calculations of the impact of the length of roads on the transfer volume. The example of individual regions demonstrates how the value of the equalizing grant changes due to the increase in the length of transport routes, all other things being equal. The horizontal segment marked with a solid line corresponds to the real length of paved roads in the constituent entity of the Russian Federation at the end of 2019. The dotted line shows the dependence of the equalizing transfer volume on the length of roads based on simulation calculations.

The graph shows that the nature of the dependence of the transfer volume on the

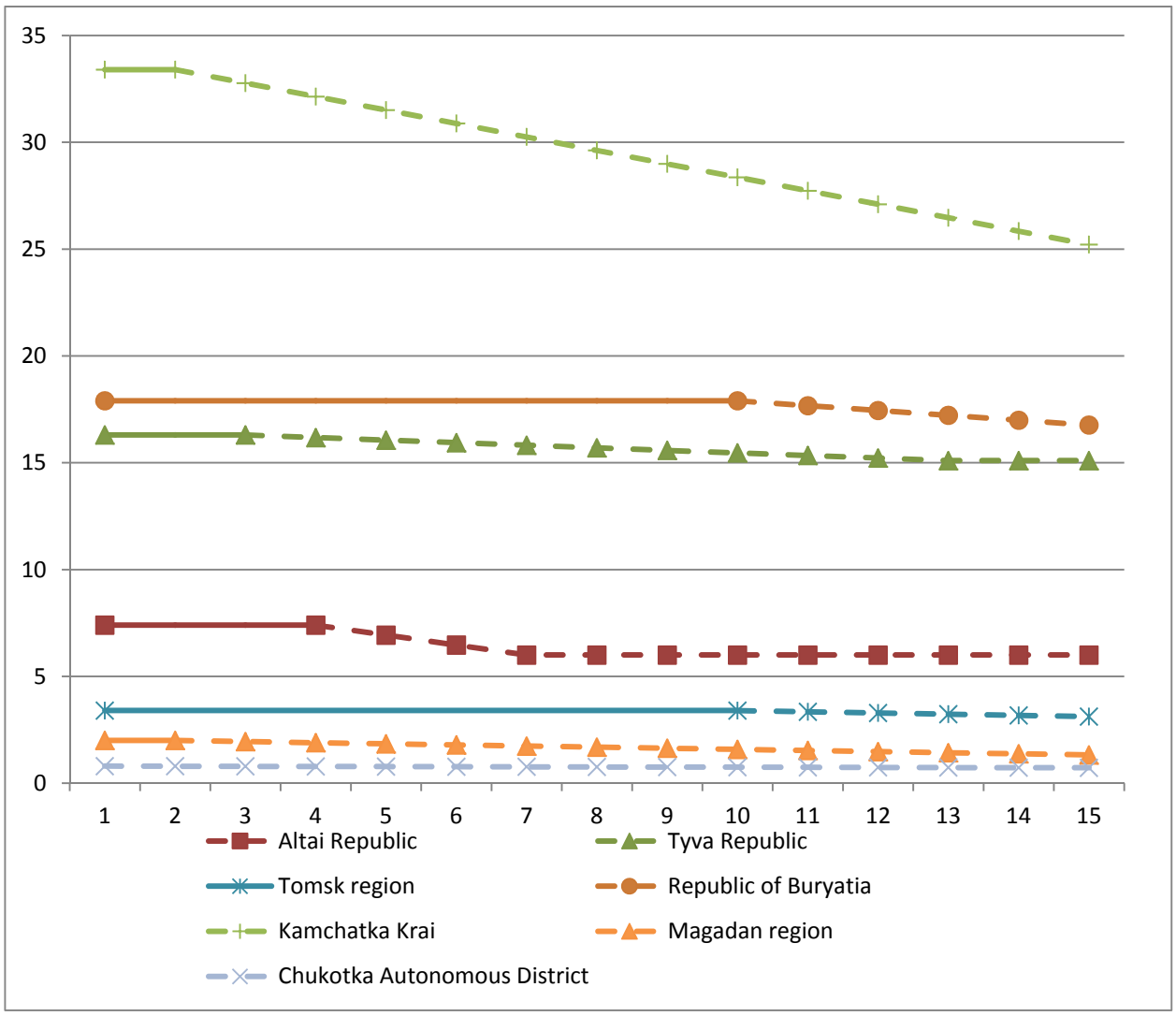

Fig. **Dependence of equalization grant (million roubles) on the length of the roads (thousand km) in 2020 in certain regions**

Source: author's calculations based on a simulation model.

length of transport routes is not uniform. On the example of the Altai Republic and the Tyva Republic, one can see how the decreasing function becomes a constant (in *Fig. 1*, the corresponding segments of the graph are shown by the dotted line). This switch in the function behavior takes place when the density of transport routes in the region reaches the average Russian level. According to formula (1), after that the length of roads do not affect the TAC value, and, as a consequence, the grant value.

By means of a simulation model, we will estimate how long the length of paved roads in each region should be, so that the density of transport routes becomes equal to the average Russian level. We will calculate the amount of grants for equalizing budgetary provision, corresponding to this indicator of the length of roads. Thus, we will find the maximum possible level of transfer reduction for each region, due to the increase in the length of transport routes. *Table 3* presents the calculation results.

Based on the calculation results in *Table 3*, we can divide the constituent entities of Russia into three conditional groups.

The first group includes the Arkhangelsk region, the Altai Republic, the Irkutsk region, the Transbaikal region and the Amur region.

Table 3

Maximum possible impact of the increase in the length of roads on the volume of equalization grant in the regions in 2020

Constituent entity of the Russian Federation	How long should the roads be for the density of transport routes to be equal to the average Russian?	How many kilometers should the length of the roads be increased?	How many % should the length of roads be increased?	What will the transfer be like?	Change in transfer, thousand roubles	Transfer change, %
Arhangelsk region	28 957	12 468	76%	4 033 826	–437 236	–9%
Altai Republic	6910	2319	51%	5 960 176	–1 410 158	–18%
Tyva Republic	12 540	8942	249%	15 138 826	–1 164 458	–6%
Irkutsk region	55 134	24 814	82%	612 118	–229 832	–27%
Tomsk region	23 039	12 707	123%	2 551 071	–825 980	–24%
Republic of Buryatia	24 903	14 138	131%	14 563 527	–3 324 441	–18%
Republic of Sakha (Yakutia)	228 808	214 762	1529%	9 139 101	–35 838 412	–79%
Transbaikal region	29 724	12 188	70%	5 007 522	–1 667 016	–24%
Kamchatka Krai	34 530	32 386	1510%	12 606 398	–20 817 956	–62%
Khabarovsk region	56 436	41 586	280%	3 106 707	–1 077 900	–25%
Amur region	23 997	8154	51%	1 871 427	–254 285	–11%
Magadan region	34 395	31 618	1138%	308 380	–1 653 690	–84%
Chukotka Autonomous District	53 659	52 737	5717%	550 391	–7 822 454	–93%

Source: author's calculations based on a simulation model.

For these regions, the density of transport routes will reach the average Russian level with an increase in the length of paved roads by 1–1.5 times. The reduction in grants ranges from 9% (Arkhangelsk region) to 27% (Irkutsk region).

The second group is the Tyva Republic, the Republic of Buryatia, the Tomsk region, the Khabarovsk region. To achieve the average Russian density of transport routes in these regions, one should increase the existing road network by 2–4 times, while the reduction in the transfer will be from 6% (Tyva Republic) to 25% (Khabarovsk region).

Finally, the third group includes the Republic of Sakha (Yakutia), Magadan region, Kamchatka Krai and Chukotka Autonomous District — the regions experiencing the greatest deficit in transport infrastructure. For these entities, the length of transport routes has the most significant effect on the volume of the equalizing transfer. *Table 3* shows that with a hypothetical increase in the coverage of the road network to the average Russian level, they will lose from 62% to 93% of equalizing grants. However, this requires an increase in the length of transport routes by 10–15 times, which seems unreal in the medium term.

CURRENT ROAD NETWORK DEVELOPMENT IN THE REGIONS AND THE FINANCIAL SIGNIFICANCE OF DISINCENTIVES

We will now consider the real dynamics of road construction in the regions over the past 5 years (2015–2019).

According to Rosstat,[5] the length of hard-surface roads over the past five years in Russia has grown by 6%, with an average annual growth rate of 1.2%. For the considered group of regions, the maximum average annual increase in the length of transport routes is in the Chukotka Autonomous District (6%). In the Republic of Buryatia, the Kamchatka Krai and the Amur Region, this indicator was 2%. It was 1% on average per year in the Republic of Sakha (Yakutia), the Altai Republic, the Tyva Republic, Irkutsk and Magadan regions, and less than 1% in the Arkhangelsk, Tomsk and Transbaikal regions. Comparing these data with the simulation calculations from *Table 2* shows that in all the regions, the average annual increase in the length of roads as those for the past 5 years, can lead to a decrease in the transfer by no more than 1%. Such losses are clearly insufficient to affect the priorities of regional policy. There is no empirical relationship between the activity of road construction and the elasticity of the amount of grants along the length of the roads. Thus, the Republic of Buryatia and the Kamchatka Krai show the pace of road construction above the national average, despite the relatively high sensitivity of grants to the length of transport routes.

The analysis of indicators of national and regional projects, as well as state programs of the constituent entities of the Russian Federation, shows that in the near future, the planned road constructions in the constituent entities under consideration is significantly lower than required to reduce the financial assistance from the federal budget by at least 1% per year. National projects do not focus on building new transport routes, but on the overhaul and reconstruction of the existing road network, which, of course, is a priority task today: the share of roads that meet regulatory requirements in the Far Eastern Federal District is only 37%, in the Siberian Federal District — 43%, in the Northwestern Federal District — 38%.[6]

In 2020, the investment activity of the regions decreased to a minimum due to the crisis caused by the coronavirus pandemic. Therefore, we have reason to assume that in the near future, the effect of reducing

[5] Federal Service of State Statistics. Transport. Length of communication lines and road infrastructure facilities. URL: https://rosstat.gov.ru/folder/23455 (accessed on 07.10.2020).

[6] Rosstat data, end of 2019, the Federal State Statistics Service. Transport. Length of communication lines and road infrastructure facilities. URL: https://rosstat.gov.ru/folder/23455 (accessed on 07.10.2020).

Table 4

Changes in the volume of equalization grant if to exclude the road length indicator in 2020

Constituent entity of the Russian Federation	Amount of grant excluding the road length indicator, thousand roubles	Change in the amount of grants, thousand roubles	Change in the amount of grants,%
Arhangelsk region	5 028 365	561 506	13
Altai Republic	6 542 236	–827 978	–11
Tyva Republic	15 846 073	–455 584	–3
Irkutsk region	1 224 604	380 331	45
Tomsk region	3 259 347	–114 490	–3
Republic of Buryatia	16 266 162	–1 626 026	–9
Republic of Sakha (Yakutia)	10 239 934	–34 741 514	–77
Transbaikal region	6 824 666	145 964	2
Kamchatka Krai	14 137 226	–19 297 048	–58
Khabarovsk region	4 013 774	–167 593	–4
Amur region	2 409 838	285 763	14
Magadan region	480 564	–1 480 313	–76
Chukotka Autonomous District	742 873	–7 637 510	–91

Source: author's calculations based on a simulation model.

grants from road construction will not have a significant impact on the behavior of regional authorities. However, disincentives become actual during large-scale road construction, associated with an increase in the length of transport routes in hard-to-reach regions by 1.5 times or more relative to the current level.

WHAT HAPPENS IF WE EXCLUDE ROAD LENGTH FROM INTERGOVERNMENTAL EQUALIZATION?

Imagine, that the length of transport routes will no longer be considered when calculating grants for equalizing budgetary provision. To do this, we must eliminate the first multiplier from formula (1). This change will automatically remove the problem of disincentives. However, what are the consequences for the volume of the transfer? *Table 4* presents the corresponding calculations.

The calculations show that excluding the road length from the methodology for calculating grants will lead to large-scale losses in the transfer of most of these regions. Especially critical losses may experience the Republic of Sakha (Yakutia), Kamchatka Krai, Chukotka Autonomous District, and Magadan region, which are disproportionately higher than the expected reduction in the transfer due to road construction on a realistic scale. To compensate for these losses, the federal center will have to provide the regions with additional financial assistance in the amount of 66.3 billion roubles, which is 13% of the total amount of grants. Thus, applying of

Table 5

Minimum additional fiscal revenues required to compensate the decrease in grants and costs for road maintenance in case of increase in the length of roads by 1 km in 2020

Constituent entity of the Russian Federation	Compensatory growth of fiscal revenues from 1 km of constructed roads, thousand roubles	For reference: income of regional road funds * per 1 km of the road
Arhangelsk region	446.2	385.5
Altai Republic	998.7	199.7
Tyva Republic	470.9	313.1
Irkutsk region	399.1	442.8
Tomsk region	437.6	478.0
Republic of Buryatia	581.2	458.9
Republic of Sakha (Yakutia)	692.8	474.6
Transbaikal region	476.4	226.2
Kamchatka Krai	1249.8	942.2
Khabarovsk region	479.9	450.6
Amur region	416.2	488.6
Magadan Region	586.5	336.8
Chukotka Autonomous District	856.2	3250.8

Source: author's calculations based on a simulation model, Ministry of Finance of the Russian Federation.

Note: * — Initial data regarding the execution of regional road funds of the constituent entities of the Russian Federation. URL: https://minfin.gov.ru/ru/perfomance/regions/mb/mb2019_2021/?id_39=123591-iskhodnye_dannye_v_chasti_ispolneniya_regionalnykh_dorozhnykh_fondov_subektov_rossiiskoi_federatsii_po_itogam_2017_goda (accessed on 08.10.2020).

equalization formula without the indicator of transport routes length is more crusial for public finance than maintaining the current formula.

TRANSPORTATION NETWORK DEVELOPMENT AS A FACTOR OF GROWTH IN REGIONAL INCOME

Increasing the transport accessibility of the northern territories, Siberia and the Far East is not only a regional issue, but also a promising strategic task at the national level. For a more objective assessment of the consequences of an increase in the length of roads, one should consider the positive effect of improving transport accessibility on the income potential of the territories. Developing transport infrastructure in the long term leads to new industries and jobs, lower costs, increased turnover, and, as a consequence, an inflow of additional revenues to the budget [9]. Based on the above simulation model, we can calculate the minimum return in the form of additional tax and non-tax revenues to the regional budget from 1 km of the constructed road necessary to compensate grant reduction. *Table 5* provides the calculation results. We calculated the amount of compensation

income considering the additional burden arising from the regional budget due to the construction of roads, namely the cost of their maintenance. The average annual cost of maintaining 1 km of paved road is determined by the data of the Ministry of Transport of Russia.[7] This calculation include the cost of road construction, since these costs are one-off, while the falling grant amount due to improved transport accessibility and road maintenance costs will occur annually.

Table 5 also provides an estimate of the income of regional road funds of the constituent entities of the Russian Federation per 1 km of a paved road. Strictly speaking, this indicator is not an estimate of the increase in budget revenues as a result of road construction, since the length of transport routes is not the only indicator determining the volume of the road fund. However, these numbers can give a rough idea of the expected growth in regional road construction revenues. In fact, the growth of regional tax revenues in the case of the transport infrastructure development will be greater, since in the future, new roads will provide not only an inflow of funds to road funds, but also additional taxes on personal income tax (due to emerging new jobs), as well as on income tax (due to expanding production and reducing costs). *Table 5* leads to the conclusion that the values from the first and second columns are quantities of the same order. Consequently, compensating for losses from a decrease in grants due to an increase in own budget revenues with the transport infrastructure development seems to be a real achievable result.

CONCLUSIONS

According to the current formula for distributing grants on equalizing budgetary provision, financial assistance for regions with a low density of the road network decreases with an increase in the length of transport routes. To test the hypothesis that the equalization formula creates disincentives for the transport infrastructure development in the regions, we did the simulation calculations based on a model reproducing grant distribution by the current methodology. The calculation results showed that an increase in the length of transport routes on a realistic scale leads to an insignificant decrease in the amount of grants for these regions (within 1%). Therefore, the current method of distributing equalization transfers in the short term does not create obstacles for the infrastructural development of the constituent entities of the Russian Federation. Today, we can consider disincentives as financially insignificant regarding their effect on the policy of regional authorities in the field of road construction. However, with an increase in the road network of hard-to-reach regions by 1.5 times or more, this decrease may become critical for such regions as the Republic of Buryatia, the Altai Republic, the Republic of Sakha (Yakutia), the Transbaikal region, the Kamchatka Krai, the Khabarovsk region, the Magadan region and the Chukotka Autonomous District. Excluding the road length from the intergovernmental equalization formula is an ineffective measure of combating disincentives, since it will cause a collapse of the transfer to the highly granted regions of the Far East and will require significant compensation from the federal budget.

The positive counter effect from road construction invites attention. By preliminary estimates, reducing grants because of an increase in the length of transport routes can be offset by an additional inflow of tax and non-tax revenues into the regional budget system due to economic growth caused by the road network development. A promising further research can be a more detailed study of the impact of the transport infrastructure development on the own revenues of sub-federal budgets.

[7] Ministry of Transport of the Russian Federation. Report on the cost of construction, reconstruction, overhaul, repair and maintenance of 1 km of public roads in the Russian Federation (2017). URL: https://www.mintrans.ru/documents/7/9755 (accessed on 08.10.2020).

REFERENCES

1. Gramlich E. Intergovernmental grants: A review of the empirical literature. In: Oates W.E., ed. The political economy of fiscal federalism. Farnborough: Lexington Books; 1977:219–239.
2. Valitova L. Intergovernmental transfers and economic incentives of regional authorities. *Ekonomicheskaya nauka sovremennoi Rossii = Economics of Contemporary Russia.* 2005;(2):39–55. URL: https://cyberleninka.ru/article/n/mezhbyudzhetnye-transferty-i-ekonomicheskie-stimuly-regionalnyh-vlastey (accessed on 08.10.2020). (In Russ.).
3. Sinel'nikov-Murylev S., Kadochnikov P., Trunin I., Chetverikov S., Vigneault M. The problem of soft budget constraints of Russian regional authorities. Moscow: Institute for the Economy in Transition; 2006. 300 p. (In Russ.).
4. Alexeev M., Kurlyandskaya G. Fiscal federalism and incentives in a Russian region. *Journal of Comparative Economics*. 2003;31(1):20–33. DOI: 10.1016/S 0147–5967(02)00011–2
5. Deryugin A. Regional alignment: Are there incentives for development? *Ekonomicheskaya politika = Economic Policy*. 2016;11(6):170–191. (In Russ.). DOI: 10.18288/1994–5124–2016–6–08
6. Courty P., Marschke G. A general test of gaming. European University Institute Economics Working Papers. 2004;(33). URL: http://www.albany.edu/economics/research/workingp/2004/gaming.pdf (accessed on 08.10.2020).
7. Bol'shakov N., Eremeeva L., Popov E. Methodological approaches to assessing the transport accessibility of the territory. In: Actual problems, directions and mechanisms of development of the productive forces of the North — 2016. Proc. 5th All-Russ. sci. semin. (Syktyvkar, Sept. 21–23, 2016). Pt. 2. Syktyvkar: Komi Republican Printing House; 2016:135–142. (In Russ.).
8. Arlashkin I., Barbashova N., Komarnitskaya A. Interbudgetary alignment of territories: Approaches to assessing spending obligations in international practice. *Finansy = Finance.* 2020;(5):43–49. (In Russ.).
9. Polynev A., Razbegin N. Background of industrial infrastructure growth in the region. *Transportnoe delo Rossii = Transport Business of Russia.* 2012;(6–2):32–35. (In Russ.).

ABOUT THE AUTHOR

Natal'ya E. Barbashova — Cand. Sci. (Econ.), Senior Researcher, Institute of Applied Economic Research, Russian Academy of National Economy and Public Administration, Moscow, Russia; Financial Research Institute, Ministry of Finance of Russia, Moscow, Russia
barbashova-ne@ranepa.ru

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Investment Function of Economic Growth in Russia

O.S. Sukharev
Institute of Economics Russian Academy of Sciences, Moscow, Russia
https://orcid.org/0000-0002-3436-7703

ABSTRACT

The intensification of investment dynamics is a determining factor in the new growth model of the Russian economy. The Covid crisis has greatly limited the opportunities to use this factor and made restoring growth dynamics an urgent task. **The aim** of the study is to determine the investment function of the Russian economy before the Covid crisis in order to identify the main instruments of the investment policy of growth in the post-crisis period. **The research methods** are macroeconomic and regression analysis based on software Gretl 2020b, which helped to choose the investment function according to the instrument-factors. Solving the problem of collinearity of multiple regression factors makes it possible to select the best models for GDP and investment in fixed assets of the Russian economy. **The research result** is selected multivariate models of gross product and investment that allow considering the impact of the following instruments on the goal's function: monetization level, key interest rate, exchange rate, risk, profitability, oil prices, financial investments, inflation. The author **concludes** that an increase in the monetization of the economy, a decrease in the key interest rate, and a controlled devaluation generally had a positive effect on the amount of investment in fixed assets. The investment growth increased the risk of economic activity; the decrease in profitability relatively decreased investment and increased Russia's GDP with an increased risk over the considered time interval. When implementing investment policy, one should consider these features along with the specified macro-aggregates, the structure of investment distribution between sectors and types of investments, for example, in financial and non-financial assets. The paper shows the significance of this condition, which affects the effectiveness of the investment policy, when the shift in investment towards financial assets accompanies the slowdown in economic growth. **The prospect** of further research is an assessment of the equalization of sectoral risks affecting the distribution of investments and investment dynamics.

Keywords: investment; gross value added; risk; profitability; investment policy; economic sectors; resource allocation; regression analysis; sensitivity of target function; economic growth

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INTRODUCTION

Many economists perceive investment [1–5] as the main engine of economic growth and structural change. As for Russia, this refers to investment in fixed assets and human capital [1, 4] or the creation of capital of different age generations, which individual models show within the reproduction theory [3]. However, the issue of the investment structure (for example, investments in financial and non-financial assets, transactional and non-transactional sectors [6–7]), i.e. their distribution by objects of use, both as a purely structural task and an assessment of efficiency, is not considered in all studies. The structural aspects of investments and their effectiveness are usually not considered when designing incentive measures for investment policies at the macroeconomic level. Sensitivity of the investment function to the instruments of economic policy is especially important. Most often, standard approaches reduce the problem of intensifying investment to increasing accumulation [2] and investment in education and human capital [1, 8, 9]. The distribution of investments depends on many conditions and factors and has a strong impact on the economic dynamics of not only sectors of the economy, but also on creating the future structure of demand, thereby determining current and future transformations of the economic structure [10–12]. Investments affect factor productivity, which determines the quality and rate of future economic growth [8, 11].

In terms of underinvestment rates, in a large sample of countries over a long period of time, some studies reveal the problem of allocating investment across countries. Underinvestment by different amounts took place in all considered countries, which increased the discrepancy in the development of these countries [13], including due to the difference in the total productivity of factors. The structure of investment in the public and private sectors also influenced to what extent public investment had a positive effect on growth and how it increased or slowed down private investment [14, 15]. The survey data do not consider all possible circumstances, for example, the crowding out effect of public and private investment with appropriate government policies in the open market. Financial strategy, the functioning of the financial market, labor market institutions can have a strong impact on growth by changing the structure of investment [16, 17]. The determining factors are closely related and define the change in each other (collinear). This limits the study of their influence using multiple regression and complicates the algorithm for choosing the appropriate model. The higher the demands on the labor market and the stronger the regulatory mechanisms are, and the market capacity is not chosen in the course of imperfect competition, the greater the need is to replace labor-intensive technologies with capital-intensive technologies. This creates the need to invest in fixed assets. Along with the need for personnel training, they provide an increase in investment in human capital, so that replacing labor with technology does not mean a decrease in investment in people. There is the connection and certain types of investments, mutually determining each other.

We should give our special attention to the state of the financial market and the relationship between financial and non-financial investments [6], when financial investments can crowd out or can stimulate non-financial investments. It depends on many factors: not only the financial market organization, but also the institutions that regulate the functioning and interaction of the real and financial sectors. This fact makes consider the sensitivity of the objective function — investment — to the parameters of macroeconomic policy, taking into account the connection of various economic elements. A decrease in the interest rate can stimulate investment in fixed assets, but can also lead to an increase in consumption, a decrease in savings, which will reduce the potential of

lending from the banking system of the real sector in a greater proportion of the relative financial sector than before. One should consider these possible outcomes, especially when currently absent factors appear and provoke crisis phenomena and a decrease in investment, in particular, the "virus attack" on the economy in 2020.

The Covid recession 2020, caused by the force majeure factor, a dangerous virus, and associated with countering it through quarantine and direct restrictive measures, differs from all previous recessions in modern times. They usually arose due to the destabilization of the financial and foreign exchange market, the devaluation of the national currency, a strong capital outflow, spreading its influence to other sectors of the economy and other countries. The present crisis is related to the fact that demand and specific types of activity in the economy are limited, while the production load on others increases (this disproportion causes a reaction of price increases). However, it is not able to withstand the multiplication of the volume reduction for other types of activity. Investments are curtailed first, and the financial market is also seriously affected [18]. At the same time, the financial sector is not a primary source for the crisis — it suffers simultaneously with other, initially transactional activities, since the fight against the virus requires limiting contacts and reducing travel (tourism, catering, restaurant business, hotel business, similar and related areas of activity). Considering that it is the transactional sector that makes a decisive contribution to the rate of economic growth of the Russian economy [5–7], the reduction in its activities in many areas affects the growth rate. The squeeze effect is also transmitted to the manufacturing sectors — as a result, a recession occurs, which is also indicated by a reduction in investment.

Thus, a return to economic growth, especially creating a certain new model, based on investment as a leading factor (until now, for a long period in Russia, the main contribution to the growth rate was made by gross consumption, but not investment spending) will require the design of the investment function of economic growth with the selection of instruments to influence it, which will form the directions of the investment policy of growth. Therefore, the aim of this study is to analyze the investment function of the Russian economy before the Covid crisis in order to identify the most relevant instruments to influence the revival of investments as one of the most significant growth factors. We used the methods of macroeconomic and regression analysis, which makes it possible to select an investment function and determine its sensitivity to various instruments of macroeconomic policy. We should discuss not only an increase in the accumulation rate, which is not a guarantee of economic growth, but can be considered as a condition affecting economic growth at a certain rate (but not to guarantee it), but also to ensure a certain investment dynamics.[1]

Lifting of restrictions on various types of activities will undoubtedly stimulate their dynamics and the development of related industries. However, the resulting risk can block investments and will inertially restrain the economic development of the prospective period. Thus, a rebound in growth rates like in 2010 relative to 2009 is hardly possible in an equivalent way in 2021 relative to 2020. In addition, designing the investment function of economic growth is useful for establishing permanent links between relevant parameters that affect on the process and structure of investments in the Russian economy. The relevant parameters considered in the next section had the strongest impact on the dynamics of investments and GDP,[2] since it

[1] The share of investments in the gross product and their growth rate together determine the contribution of the investment component of expenditures to the economic growth of the country (but not just one share — the accumulation rate).

[2] These parameters include: monetization level, key interest rate, risk, profitability, exchange rate, oil price, tax burden.

influenced its structure and the development of elements. We now designate the research methodology.

INVESTMENT FUNCTION OF ECONOMIC GROWTH. RESEARCH METHODS

Economic growth is estimated according to the country's GDP dynamics, and gross investment is a component of this product measured by expenditures. Economic policy instruments affect GDP components, including investment, which determines both the current and future dynamics of the economy [19–20]. J. Tinbergen demonstrated that the number of instruments should be no fewer than the number of policy goals [20]. However, the principle of "goals-instruments" can be changed due to the fact that one and the same instrument, when influencing differently the components of the objective function (GDP), can act in one direction for each of the components. For example, a change (decrease) in the interest rate increases investment and gross consumption, which enhances the positive impact on the dynamics of gross domestic product. Sometimes, the same policy instrument has a positive effect on one component, but the negative one on another, or does not affect it at all. Thus, determining the influence of investments on the country's economic growth should be reduced to determining the influence of investments on GDP over the past time interval, thereby establishing the fact of this determination, and also to build an investment function, highlighting the instruments that affect investments, removing the problem of their collinear relationship. The selected instruments will also have an impact on other components of GDP, so it will be necessary to assess their impact on the value of the product.

This approach definitely includes the economic policy measures that were taken during the considered time interval. The established links include the used instruments of economic policy. There is a non-typical problem of longer use of these instruments. Apparently, if the instruments are closely connected to the goal function and have a positive effect on the dynamics of its other components, including investments, one should continue using these instruments. Otherwise, if they negatively affect other components of GDP, so that they can slow down its growth, or the close connection with the goal function is not so significant, one should correct the use of these instruments when planning economic policy measures in the following time intervals.

Economic growth is determined by labor and capital, and investment [21]. We will study the influence of investments on growth by the algorithmic sequence in stages. It can be very important how investment is allocated between labor and capital and how they set certain prospects for economic growth. If the country has the most developed labor-intensive technologies, but it needs capital renewal, the transition to this renewal can significantly weaken economic growth in a certain initial period of time. It is possible that the ratio and state of technology will greatly affect the efficiency of investments and the economic dynamics that they provide. If the pace creates the most optimistic expectations for economic development, then it will probably be useful to invest in labor-intensive technologies at the initial stage. In this case, they will quickly provide a return, but it must be such as to create conditions for the regime of technological renewal and personnel training.[3] At the next stages, it will naturally look like a stake on capital-intensive technologies and the primary replacement of capital by its new forms.

Thus, it is appropriate to consider three stages to solve the analytical problem.

[3] Today, there are no effective methods of macroeconomic and investment policy, which would consider the structure of investments, technologies, funds and labor. Usually, a very complex set of systemic measures can be applied within the framework of a combined economic policy aimed at structural modification of the economy and its sectors.

First. We will consider the indicated basic growth factors (capital, labor, investment) in the constructed multiple regression model for the Russian economy, determining the reaction of gross value added to the value of the key interest rate, and money supply M_3.[4]

Second. We will build a multiple regression model of the gross value added (Y) of the Russian economy depending on the following instrument-factors: X_1 is the level of monetization, %; X_2 is the risk,[5] billion roubles, in the prices of 2011; X_3 is the key rate of the Central Bank of the Russian Federation, %; X_4 is the average nominal dollar rate, roubles; X_5 is the average annual price of Urals oil, USD; X_6 is the inflation, %.

The general view of the regression model is as follows:

$$Y = a_0 + a_1{*}X_1 + a_2{*}X_2 + a_3{*}X_3 + a_4{*}X_4 + a_5{*}X_5 + \\ + a_6{*}X_6 + \varepsilon,$$

where a_i is the regression coefficients; ε is the standard error of the model.

The regression is based on software Gretl 2020b using the least squares method. All possible models are built by the enumeration method, the multicollinearity of factors is revealed by the pairwise correlation method with further rejection of the corresponding variants of the models.

We used the Breusch–Pagan test to check the heteroscedasticity of the random errors of the regression model. It resulted in the homoscedasticity of the variances of random errors of the considered regressions for the best selected model. We used the Durbin-Watson (DW) test to check the hypothesis of the absence of autocorrelation of residuals. Comparing the DW statistics with the theoretical parameters d_1 and d_u, we found that the DW value in the selected regression models is in interval $d_u < DW < 4 - d_u$. This indicates the absence of autocorrelation. We applied a similar algorithm for the next step of the study, which directly concerns the design of the investment growth function.

Third. We will build a multiple regression model with a target investment function (investments in fixed assets — I) for the Russian economy from the following factors: Z_1 is the risk, billion roubles, in 2011 prices; Z_2 is the profitability, %; Z_3 is the key rate of the Central Bank of the Russian Federation, %; Z_4 is the average nominal dollar rate, roubles; Z_5 is the financial investments, billion roubles, in the prices of 2011. The regression equation is as follows: $I = b_0 + b_1{*}Z_1 + b_2{*}Z_2 + b_3{*}Z_3 + \\ + b_4{*}Z_4 + b_5{*}Z_5 + \varepsilon 1$, where b_i is the regression coefficients; ε1 is the standard error of the model. The models are selected by the least squares method, multicollinear factors are determined by the pairwise correlation method, and the best regression models are selected by screening.

The implementation of these three steps will help formulate a general conclusion about the impact of investments on economic growth in the period under review and the possibilities of investment policy to stimulate economic growth in Russia in the coming period.

INVESTMENT POLICY INSTRUMENTS FOR ECONOMIC GROWTH

We will carry out a step-by-step solution to the above analytical problem, which allows us to identify the impact of investments on the economic growth of the Russian economy. We will carry out a regression analysis of the gross domestic product, assessed by the value added, and highlight the factors influencing its dynamics, including investments in fixed assets. We will also build an investment function, ensuring its study from the point of view of relevant instruments and pursuing an investment growth policy.

[4] The amount of money supply M3 is understood as the amount of currency outside the banks; demand deposits; temporary, savings and foreign currency deposits; bank and travel checks; other securities such as certificates of deposit and commercial paper. The World Bank. URL: https://data.worldbank.org/indicator/FM.LBL.BMNY.GD.ZS?view=chart (accessed on 25.11.2020).

[5] Risk refers to the standard deviation of gross profit.

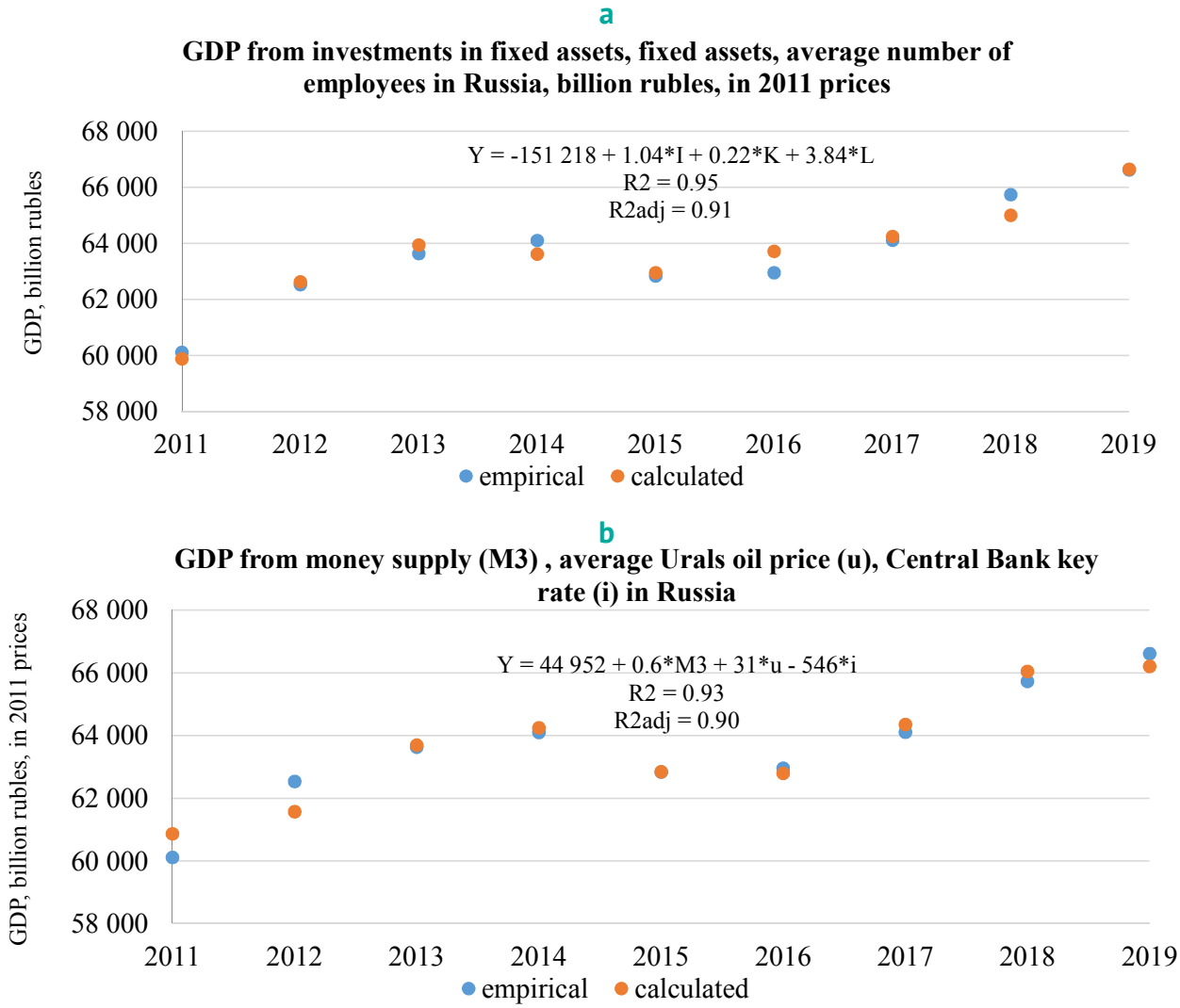

Fig 1. **Models of Russia's GDP from capital, labour and investment* (a), money supply, oil price and key interest rate** (b), 2011–2019**

Source: compiled by the author based on data from the World Bank. URL: https://data.worldbank.org/indicator/FM.LBL.BMNY.GD.ZS?view=chart; https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?view=chart; https://data.worldbank.org/indicator/FR.INR.DPST?view=chart; https://data.worldbank.org/indicator/FR.INR.LEND?view=chart; Росстата. https://www.gks.ru/accounts; ЕМИСС. URL: https://www.fedstat.ru/indicator/43007; https://www.fedstat.ru/indicator/58699; https://fedstat.ru/indicator/58538; https://fedstat.ru/indicator/40442. (accessed on 04.10.2020).

* Model statistics: F-test = 29.2; D-W-calculation = 2.1 ∈ [1.32; 2.68]; White's test: χ^2 calculation = 1.12; χ^2 index = 15.5. Regression statistics: Multiple R = 0.97264932609489; R^2 = 0.946046711552844; Normalized R^2 = 0.913674738484551; Standard error 553.772831037142 (9 observations).

** Model statistics: F-test = 23.8; D-W calculation = 2.5 ∈ [1.32; 2.68]; White's test: χ^2 calculation = 0.45; χ^2 index = 15.5. Regression statistics: Multiple R = 0.966665269362855; R^2 = 0.934441742992362; Normalized R^2 = 0.895106788787779; Standard error 610.430723626548 (9 observations).

Fig. 1 presents the results. The GDP models are built regarding investments in fixed assets (*I*), fixed assets (*K*), average number of employees (*L*) in the prices of 2011 (left). In addition, we built a model that connects GDP and the following instruments-factors as money supply (M_3), oil price (*u*), key interest rate (*Fig. 1*, right). Based on the constructed graphs in *Fig. 1*, reflecting the above models, we see that the same change in labor,

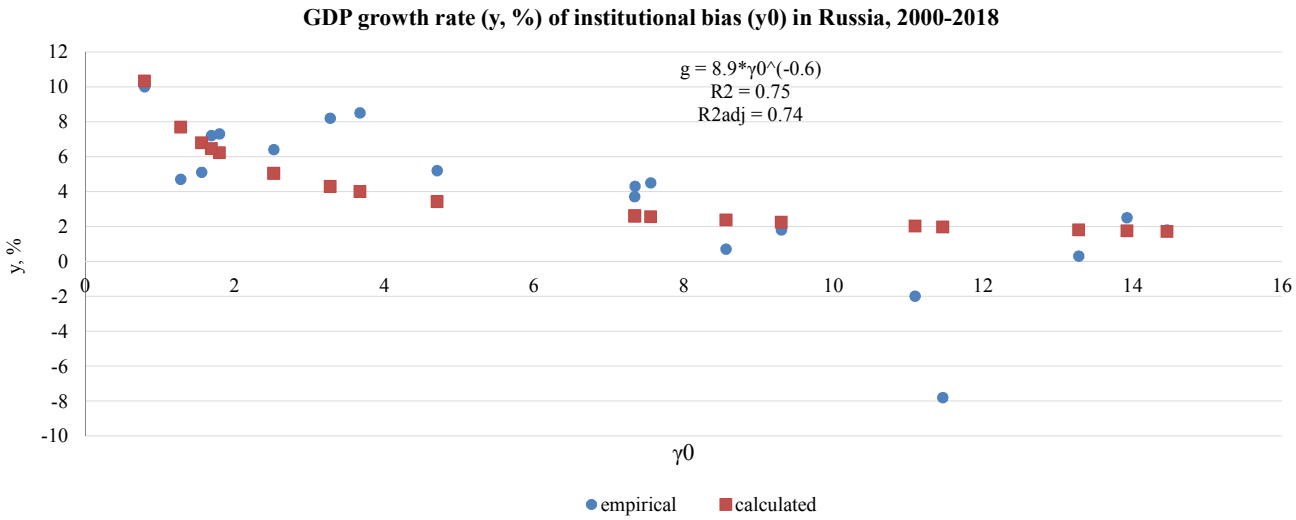

Fig 2. **Institutional displacement of the financial market (γ_0) and the growth rate of the Russian economy*, 2000–2018**

Source: compiled by the author based on Rosstat data. URL: https://www.gks.ru/investment_nonfinancial; https://www.gks.ru/folder/14476; https://www.gks.ru/storage/mediabank/tab1(2).htm; https://www.gks.ru/investment_nonfinancial; https://www.gks.ru/folder/14476; https://www.gks.ru/storage/mediabank/tab1(2). htm (accessed on 04.10.2020).

* Model statistics: F-test = 11; D-W-calculation = 1.8 ∈ [1.4; 2.6]; White's test: χ^2 calculation = 11.3; χ^2 index = 28.9.

investment and fixed capital affects GDP in terms of strength in the specified order (labor, investment, capital). This suggests that in the interval under consideration, an equivalent relative increase in each component provided a stronger impact on GDP (increase) from labor, then investment and fixed capital. Thus, we can talk about the predominance of labor-intensive technologies. Even proceeding from the collinearity of investments in fixed assets and funds (in this model, we intentionally did not omit the issue of collinearity to show a separate influence, and the statistics of the model are very significant), the labor factor turns out to be more significant in influencing the change in GDP, also, in this case (with a two-factor model).

In the GDP model (*Fig. 1*, left), investments, capital and labor are not visible investments in human capital, which can play an important role for long-term economic growth. However, given the high importance of labor in economic growth and the very limited opportunities for funds (technologies), given the limitations on investment dynamics, the Russian economy seems to be in great need of technological and stock modernization. Further training and retraining of personnel will need to be adjusted correspondingly. *Fig. 1* (right) clearly shows that an increase in the money supply, and especially in oil prices, has a positive effect on the gross domestic product — it affects its increase. The growth of the key interest rate reduces the value of the gross domestic product.

Over the considered time interval, within the macroeconomic policy of stabilizing and stimulating growth, despite the low growth rate of the Russian economy, almost accurate ratios have formed. They show that monetization as a whole contributes to GDP growth, as does the use of the labor factor, as well as investment in fixed assets. Alongside, the models show the need to reduce the key interest rate, which was observed after the recession of 2015–2016, as well as the need for further efforts to increase the impact of investments on economic dynamics.

What should these efforts consist of? A structural problem that is usually overlooked in standard macroeconomic and investment policies is the increasing bias of the financial

Fig. 3. **Russian GDP growth rate and M3 growth rate (a*), key interest rate (b)**, 2012–2019**

Source: compiled by the author according to the World Bank, Rosstat, Central Bank of the Russian Federation. URL: https://data.worldbank.org/indicator/FM.LBL.BMNY.GD.ZS?view=chart; https://www.gks.ru/accounts; https://www.gks.ru/accounts; https://cbr.ru/hd_base/keyrate/ (accessed on 04.10.2020).

* Model statistics: F-test = 27.0; D-W calculation = 1.4 Є [1.33; 2.67]; White's test: χ^2 calculation = 8.6; χ^2 index = 14.1

** Model statistics: F-test = 39.2; D-W calculation = 1.34 Є [1.33; 2.67]; White's test: χ^2 calculation = 2.9; χ^2 inde. = 14.1

market relative to other economic activities. This circumstance is expressed in the growth of the institutional bias parameter γ_0 [7, p. 74–76] due to a disproportionate increase in financial investments relative to investments in non-financial assets with a decrease in interest rates.[6] Due to this effect, stimulating growth, like investment, and lowering interest rates may not be obvious, since the growth of institutional displacement will slow down economic growth observed in Russia, when the decrease in the interest rate no longer had a strong effect on the rate of economic growth (*Fig. 2*). However, on the whole, this decrease in interest rates stimulated an increase in GDP, which is confirmed by the presented models. With a decrease in the key interest rate, financial investments in Russia increased several times more than investments in non-financial assets, which sharply increased the shift γ_0. The increase in the institutional bias of the financial market was accompanied in Russia, on average, by a decrease in the growth rate over the considered time interval (*Fig. 2*).

[6] Financial and non-financial investments were estimated at the prices of 2005 to calculate γ0.

Table 1

Comparative characteristics of models for Russia's GDP

Index	1	2	3	4	5
R^2	0.86	0.82	0.8	0.8	0.8
R^2_{adj}	0.78	0.71	0.69	0.68	0.7
F-test	10.5	7.6	6.9	6.7	6.9
P-value (F)	0.014	0.026	0.032	0.033	0.032
Durbin-Watson statistics	1.8	1.3	1.3	1.4	1.3
Significant / regression coefficients before factors	– /X_1, X_2, X_3	X_2 /X_1, X_6	X_2 /X_4, X_6	X_2 /X_3, X_5	X_2 /X_5, X_6

Source: compiled by the author based on the models built in Gretl 2020b.

Fig. 3 shows empirical points. The selected models are based on them and reflect the relationship between the growth rate of Russia's GDP and that of the money supply M_3 and the change in the key interest rate in the period 2012–2019. The decrease in the key interest rate was accompanied by an increase in the growth rate. The change in the dynamics of the money supply has a connection with the growth rate that is more complicated for the Russian economy. Namely, with an increase in the growth rate of the money supply from negative values to + 4%, the growth rate of Russia's GDP increased, with a higher dynamics of the money supply (above 4%), it decreased. In the considered time interval, there was an explicit restriction on the money supply growth resulting from the influence of the money supply dynamics on the economic growth rate. This influence may be due to other factors that are no less, and even more relevant in their influence on the growth rate in some periods than the money supply dynamics. The influence of the growth rate of the money supply on the economic growth rate will vary according to the current monetization. With a relatively low monetization (40–60%), this influence may turn out to be more significant, and with a higher level of monetization, it may be much smaller. This influence being determined for some time interval, does not mean that it can be transferred to the next period, when a different combination of factors may appear that influence economic growth and become more significant.

If we assess the impact lags, after a certain connection is identified, it is possible to transfer it to the next period. Thereby we present the monetary policy of the next stage depending on the results of the previous one and adjust it considering the incremental effect, and predict a possible change in the established communication. A scenario design technique will be useful, when one scenario can be replaced during implementation with another evaluated option.

The analysis shows that in the period under review for the Russian economy both the decrease in the key interest rate, which entailed a decrease in other interest rates, and an increase in the growth rate of the money supply by no more than 4%, in general, contributed to an increase in the economic growth rate. Although the decrease in the interest rate did not obviously affect the rate, it rather influenced the possibility of increasing GDP, but at a lower rate. Most likely, other factors had an impact that slowed down growth, did not allow an increase in the rate, so that a

Table 2

Comparative characteristics of models for investment in fixed assets in Russia

Index	M1	M2	M3	M4
R^2	0.745	0.665	0.679	0.431
R^2_{adj}	0.592	0.464	0.572	0.241
F-test	4.9	3.3	6.4	2.3
P-value (F)	0.06	0.12	0.03	0.18
Durbin-Watson statistics	2.4	2.2	2.2	1.9
Significant / regression coefficients before factors	const. Z_3 / Z_2. Z_4	const / Z_1. Z_3. Z_4	const. Z_3 / Z_5	const. Z_4 / Z_5

Source: compiled by the author based on the models built in Gretl 2020b.

decrease in the key interest rate did not ensure the rate acceleration, but performed a positive function of stimulating growth. An interesting effect took place in the Russian economy in 2000–2018, when savings did not decrease with a decrease in the interest rate, but almost doubled [22, p. 22, 23]. It seems that classical connections and patterns are refuted by developing a specific economy, which requires clarifying not only the reasons for changing these parameters, but also their connections, which seems to be a more difficult task.

Our assessment of the influence on growth immediately includes the implemented policy measures for the indicated period, no matter how criticized the policy being pursued and proposals for more significant monetization are put forward. Currently, with this monetization at a higher rate, it would be possible to reduce the growth rate, and by transferring the economy to a new higher level of monetization, to change the law of the relationship between the economic growth rate and the growth rate of the money supply. This would have to be determined and considered in the further formation of monetary policy.

Now we will implement the next stage of the study, reduced to building GDP multiple regression (Y is determined by gross value added). It depends on the change in the set of these instruments. According to the pairwise correlation method, the following pairs of factors for multiple regression of the gross value added of the Russian economy are multicollinear: X_1-X_4; X_1-X_5; X_3-X_6; X_4-X_5 (the designation of factors is in the previous paragraph).

By the method of sequential exclusion of multicollinear factors, we select the best ones according to the calculated statistics — the most significant models:

1) $Y = 53997 + 255^*X_1 + 6^*X_2 - 675^*X_3$;
2) $Y = 56883 + 64^*X_1 + 16^*X_2 - 87^*X_6$;
3) $Y = 59264 + 19^*X_2 - 3^*X_4 - 33^*X_6$;
4) $Y = 58815 + 20^*X_2 - 18^*X_3 + 2^*X_5$;
5) $Y = 59131 + 19^*X_2 + 0.9^*X_5 - 35^*X_6$.

Model statistics are presented in *Table 1*.[7]

Based on *Table 1*, the best of the built regression models for the gross value added of the Russian economy is as follows:

$$Y = 53997 + 255^*X1 + 6^*X2 - 675^*X3.$$

[7] Hereinafter, the tables show the most frequently compared statistical indicators. The Breusch — Pagan test, Akaike, Hannan — Quinn, Schwarz tests, etc. were also calculated. All criteria are met and are statistically satisfactory. Software Gretl 2020b is used.

From the model, cleared of collinear factor instruments, we see that monetization allowed an increase in gross value added (an increase in monetization was accompanied by an increase in value added). The increasing key interest rate reduced the possibility of growth in value added. Over the considered time interval, an increase in value added took place together with an increase in the risk of doing business (in terms of profit dispersion). This means unstable dynamics and economic development with exhausting potential.

The final stage of the study involves assessing multiple regression for investment in fixed assets. The pairwise correlation method reveals multicollinear pairs of factors: Z_1-Z_2; Z_1-Z_5; Z_2-Z_5; Z_4-Z_5. Excluding collinear factors, we come to the most significant four models: M1-M4. The most frequently used statistics are given (for the period 2011–2019, nine points) as comparative characteristics of the models in *Table 2*.[8]

M1: $I = 14441 - 103*Z_2 - 270*Z_3 + 2{,}3*Z_4$;
M2: $I = 12946 + 1{,}6*Z_1 - 155*Z_3 - 12{,}3*Z_4$;
M3: $I = 13546 - 226*Z_3 - 0{,}006*Z_5$;
M4: $I = 11986 - 35*Z_4 + 0{,}02*Z_5$.

Based on *Table 2*, M1 model is the most significant of those considered: $I = 14441 - 103*Z_2 - 270*Z_3 + 2.3*Z_4$. This model shows that the rise in interest rates slowed down investment. The depreciation of the rouble encouraged investment. Profitability declined on average along with investment, which caused its influence within the selected model on the total amount of investments. The structural aspect of investment allocation by sector is strongly connected to the difference in profitability of these sectors (as shown in the next section). Higher profits did not lead to an increase in investment in the considered segment of the development of the Russian economy. This circumstance is reflected in the resulting regression model, which embodies the investment function. An increase in risk has accompanied an increase in investment and financial investments restrained investments in fixed assets (model M3) [6, 7].

The use of investment policy instruments for growth in Russia requires a systemic measurement. Changes in the well-known macroeconomic aggregates (money supply, interest rate or exchange rate) can have a significant impact on investment and growth. To be targeted and systematic, the structural parameters of the economy and basic institutions require a change enhancing this influence.

RESOURCES OF ECONOMIC SECTORS AND INVESTMENT POLICIES

The modern discussion about the economic growth of Russia [1, 2, 5] touches upon the issue of investment sources.[9] However, two important aspects are usually left out: those concerning both the agents who are able to dispose of these resources from known sources, and the agents who are able to accept and implement investments with a given efficiency. There is also no assessment of the available resources concentrated in the sectors of the Russian economy. It is about those sectors (transactional and raw materials), whose well-being increased due to the curtailment of other activities (manufacturing sectors) in the previous period. Most likely, they received an overestimated or surplus resource, which can also be used to level the situation in the sectoral context. This may create a scenario of a structural policy that can change the model of economic growth in Russia. This structural transformation would allow for additional investment in the areas that need to be developed, for example, setting the task of industrialization [23]. Thus, effective structural changes [24] can have a very significant effect on total productivity and support economic

[8] The Breusch — Pagan test, Akaike, Hannan — Quinn, Schwarz and others were also calculated using the Gretl 2020b program. All criteria are met.

[9] This refers to the volume of the invested resource and its location. For example, the country's foreign exchange reserves or the accumulated resource (National Welfare Fund), the savings of citizens concentrated in the banking system with potential for investment, the increase in public debt, etc. [1].

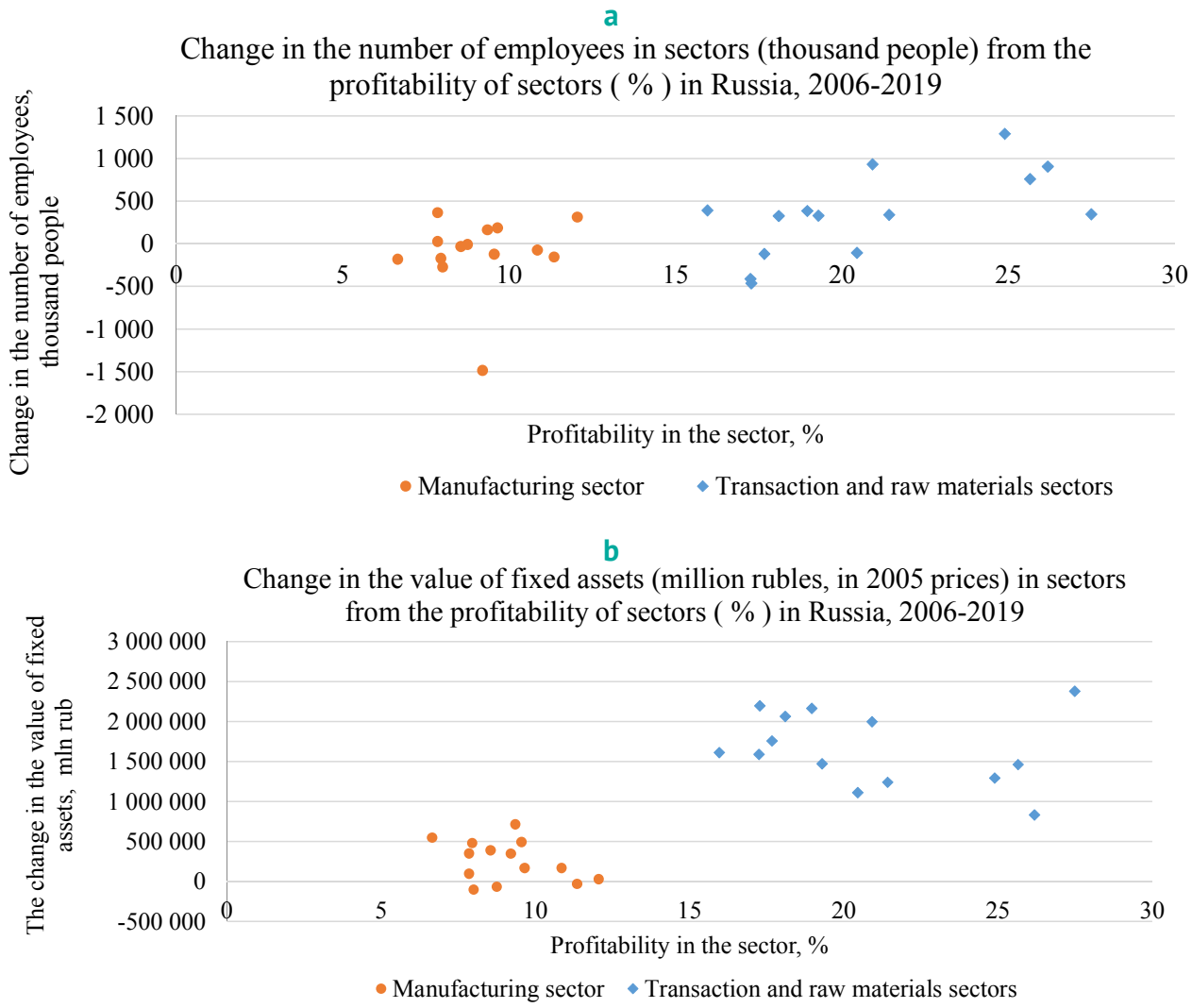

Fig 4. **Change in the number of employed (a) and fixed assets (b) in the sectors (manufacturing and transactional raw materials) of the Russian economy, 2006–2019**

Source: compiled by the author based on data: Rosstat. URL: https://rosstat.gov.ru/labour_force; https://rosstat.gov.ru/free_doc/new_site/finans/fin12_bd.htm.; https://rosstat.gov.ru/free_doc/new_site/business/osnfond/nal_ved2.htm (accessed on 04.10.2020).

growth. As for foreign investments [25], they did not constitute a significant investment resource for the Russian economy and will not represent it due to the existing set of limitations.

At the end of the study, we will consider the structural and investment problem of the development of the Russian economy (*Fig. 4, 5*). The figures show the change in the number of employees and the value of fixed assets in the prices of 2005 for the period 2006–2019 in the manufacturing and transactional raw materials sectors[10] of the Russian economy.

[10] The manufacturing sector includes the following types of activities: manufacturing; construction (according to the OKVED Rosstat). The transactional raw materials sector includes the following types of activities: agriculture, forestry, hunting, fishing and fish farming; mining; provision of electrical energy, gas and steam; air conditioning; water supply; water disposal, organization of waste collection and disposal, activities to eliminate pollution; wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; activities of hotels and catering establishments; activities in the field of information and communication; financial and insurance activities; activity on operations with real estate; professional, scientific and technical activities; administrative activities and related additional services; public administration and military security; social Security; education; activities in the field of health and social services; activities in the field of culture, sports, leisure and entertainment; provision of other types of services. Profitability of sold goods, products (works, services) as an arithmetic mean for the types of activities included in the sector. Rosstat. URL: https://rosstat.gov.ru/bgd/regl/b20_11/IssWWW.exe/Stg/d01/15–09.doc (accessed on 01.10.2020).

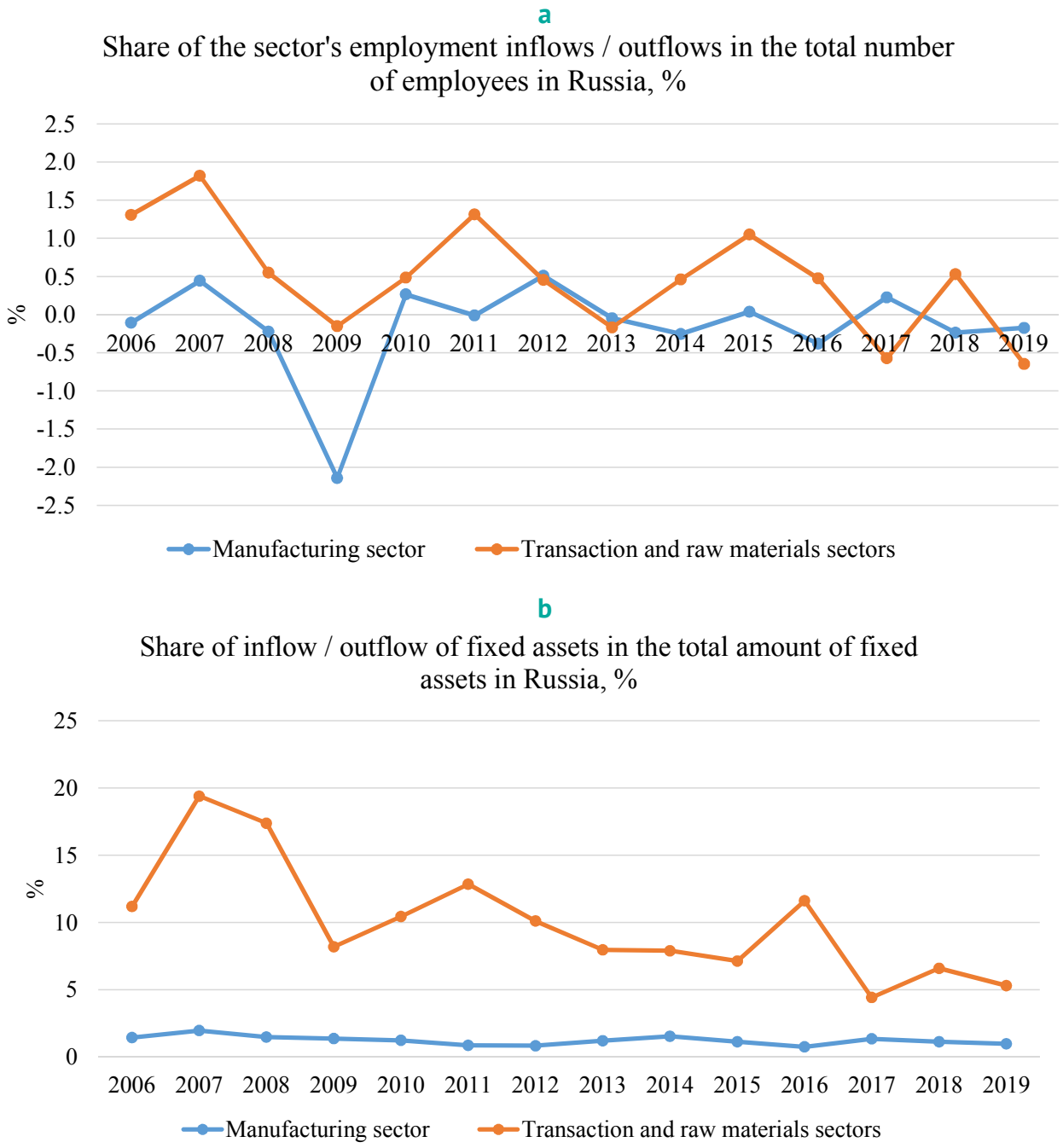

Fig 5. **The share of inflow / outflow of employed (a) and fixed capital (b) in the total amount of employed and funds in the sectors of the Russian economy, 2006–2019**

Source: compiled by the author based on Rosstat data. URL: https://rosstat.gov.ru/labour_force; https://rosstat.gov.ru/free_doc/new_site/business/osnfond/nal_ved2.htm (accessed on 04.10.2020).

Fig. 4, 5 demonstrate that the manufacturing sector showed lower profitability compared to the raw materials transaction, which ensured the difference in investments and a significantly different inflow of fixed assets with a clear predominance towards the transactional raw materials sector. This was a consequence of the distribution of investment between these two basic economic sectors. Moreover, there was mainly an outflow of

employed personnel from processing, and the inflow of personnel into the transactional raw materials sector (*Fig. 5*, left).

During the considered period, the inflow of fixed assets in two sectors decreased (*Fig. 5*, right), but the number of employees moving from one sector to another also decreased (*Fig. 5*, left). This circumstance indicates the curtailment of economic dynamics due to negative investment dynamics, especially in 2013–2016. The 2020 crisis will not change the situation, but on the contrary, it will exacerbate the problem of underinvestment in the Russian economy, especially in the sectoral context.

The manufacturing sector is on average twice more risky regarding economic activity in relation to the transactional raw materials sector [7], and it permanently lacks resources for development. Low profitability and high risk (in terms of the standard deviation of gross profit) confirm the actual blocking of the investment dynamics necessary for the development explain the shift of labor resources to the transactional and raw materials sectors. A significantly higher inflow of fixed assets is due to the work of the raw materials sector within the considered aggregate in the form of the transactional raw materials sector of the Russian economy. The reduction in risk in the transactional sector was accompanied by an increase in investment and in the non-transactional sector,[11] investment growth occurred with an increase in risk [22, p. 21]. As a result, the total amount of investments showed a very complex dependence on the risk of conducting economic activity. The connection that large investments correspond to a lower risk was not so unambiguous, especially since the overall risk in the Russian economy increased over the considered period, while investments, on average, decreased.

Consequently, in addition to the macroeconomic investment function, which helps study the general parameters of the investment influence on growth, it is necessary to consider a systemic perspective of investment policy tasks, including the use of resources concentrated in the economic sectors. Thus, it will be possible to make the structural investment policy the central instrument of the new economic growth policy and to overcome the emerging crisis regardless of its causes.

CONCLUSIONS

To sum up, we will formulate the main conclusions regarding the activation of investments as the future growth drive of the Russian economy.

First, a general macroeconomic policy oriented towards aggregate indicators (as an accumulation rate) requires a general vector to increase investments in the gross product and increase their dynamism, which will ensure an increase in the contribution of investments to the economic growth rate. However, this policy will not bring long-term benefits to the Russian economy if the structure of investment distribution is not considered.

Second, it is necessary to reduce the overall risk of doing business, especially in the manufacturing sectors and in the economy as a whole, as well as further use of such instruments as monetization (at a rate of no higher than 4% to increase M_3), lowering interest rates (this measure is already being applied), even with the ambiguous influence of the last instrument on the dynamics of investments, since other factors and structural and institutional conditions turn out to be significant. A useful instrument will be a controlled depreciation of the national currency, which has a positive effect on the investment function, and implementing the import substitution policy, which will also help to boost investment.

[11] One can also use this macroaggregate breakdown into two sectors. The risk for aggregated sectors is calculated as the standard deviation of profit in the prices of 2005. Profit is summed up by the types of activities included in the sector. Rosstat https://rosstat.gov.ru/bgd/regl/b20_11/IssWWW.exe/Stg/d01/15–04.doc (accessed on 01.10.2020).

Third, straightening of the structural imbalances of the Russian economy is a special direction of investment policy. In particular, the strong superiority that requires elimination, investments in financial assets over investments in non-financial assets, and the transactional and raw materials sectors over the manufacturing sector, which is expressed in the dynamics of fund renewal and labor resource movement. This dynamics also slows down investments and deforms their structure. The distribution of investments between new and obsolete technologies is such that it does not contribute to an increase in the general manufacturability [22]. This indicates the importance of structural and institutional factors in the investment function. If they are not considered, the classic macroeconomic form of the investment function built on aggregates is unlikely to lead to the successful implementation of investment policy.

The possibilities of using the investment function of the economic growth in Russia go beyond the purely macroeconomic framework of the aggregate approach to its design, although the usefulness of this approach used in this article is beyond doubt. In the long term, it should be accompanied by a structural analysis, and the investment function should include the risk and profitability factor determining the distribution of investments in the economy between the directions of use, which was done here at the aggregated level of analysis for the total amount of investments in fixed assets.

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REFERENCES

1. Aganbegyan A. G. Reduction of investments is destruction for the economy, growth of investments is its salvation. *Ekonomicheskie strategii = Economic Strategies*. 2016;18(4):74–83. (In Russ.).
2. Glaz'ev S. Yu. Thoughts about the ways to ensure economic growth of Russia. *Nauchnye trudy Vol'nogo ekonomicheskogo obshchestva Rossii = Scientific Works of the Free Economic Society of Russia.* 2017;203(1):229–242. (In Russ.).
3. Maevsky V.I., Malkov S. Yu., Rubinstein A.A. Analysis of the economic dynamics of the US, the USSR and Russia using the SMR-model. *Voprosy ekonomiki*. 2018;(7):82–95. (In Russ.). DOI: 10.32609/0042–8736–2018–7–82–95
4. Teixeira A.A., Queirós A.S. Economic growth, human capital and structural change: A dynamic panel data analysis. *Research Policy*. 2016;45(8):1636–1648. DOI: 10.1016/j.respol.2016.04.006
5. Sukharev O.S. Economic growth, institutions and technologies. Moscow: Finansy i statistika; 2014. 464 p. (In Russ.).
6. Sukharev O.S., Voronchikhina E.N. Financial and non-financial investments: Comparative econometric analysis of the impact on economic dynamics. *Quantitative Finance and Economics*. 2020;4(3):382–411. DOI: 10.3934/QFE.2020018
7. Sukharev O.S. Investments in the transactional sector and in financial assets: Impact on economic growth. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2020;24(3):60–80. (In Russ.). DOI: 10.26794/2587–5671–2020–24–3–60–80
8. Helpman E. The mystery of economic growth. Cambridge, MA: Belknap Press; 2010. 240 p. (Russ. ed.: Helpman E. Zagadka ekonomicheskogo rosta. Moscow: Gaydar Institute Publ.; 2011. 240 p.).
9. Saviotti P.P., Pyka A., Jun B. Education, structural change and economic development. *Structural Change and Economic Dynamics*. 2016;38:55–68. DOI: 10.1016/j.strueco.2016.04.002
10. Alonso-Carrera J., Raurich X. Demand-based structural change and balanced economic growth. *Journal of Macroeconomics*. 2015;46:359–374. DOI: 10.1016/j.jmacro.2015.10.005

11. Samaniego R.M., Sun J.Y. Productivity growth and structural transformation. *Review of Economic Dynamics*. 2016;21:266–285. DOI: 10.1016/j.red.2015.06.003
12. Zeira J., Zoabi H. Economic growth and sector dynamics. *European Economic Review*. 2015;79:1–15. DOI: 10.1016/j.euroecorev.2015.06.007
13. Perelman S., Walheer B. Economic growth and under-investment: A nonparametric approach. *Economics Letters*. 2020;186:108824. DOI: 10.1016/j.econlet.2019.108824
14. Afonso A., St. Aubyn M. Economic growth, public, and private investment returns in 17 OECD economies. *Portuguese Economic Journal*. 2019;18(1):47–65. DOI: 10.1007/s10258–018–0143–7
15. Afonso A., Jalles J. How does fiscal policy affect investment? Evidence from a large panel. *International Journal of Finance and Economics*. 2015;20(4):310–327. DOI: 10.1002/ijfe.1518
16. Calcagnini G., Giombini G., Travaglini G. A theoretical model of imperfect markets and investment. *Structural Change and Economic Dynamics*. 2019;50:237–244. DOI: 10.1016/j.strueco.2019.07.005
17. Swamy V., Dharani M. The dynamics of finance-growth nexus in advanced economies. *International Review of Economics & Finance*. 2019;64:122–146. DOI: 10.1016/j.iref.2019.06.001
18. Sukharev O.S. Economic crisis as a consequence COVID-19 virus attack: Risk and damage assessment. *Quantitative Finance and Economics*. 2020;4(2):274–293. DOI: 10.3934/QFE.2020013
19. Tinbergen J. The duration of development. *Journal of Evolutionary Economics*. 1995;5(3):333–339. DOI: 10.1007/BF01198312
20. Tinbergen J. Economic policy: Principles and design. Amsterdam: North-Holland; 1956. 276 p.
21. Anchishkin A.I. Forecasting the rates and factors of economic growth. Moscow: MAKS Press; 2003. 300 p. (In Russ.).
22. Sukharev O.S. Investment policy of economic growth. *Vestnik Yuzhno-Rossiiskogo gosudarstvennogo tekhnicheskogo universiteta (Novocherkasskogo politekhnicheskogo instituta). Seriya: Sotsial'no-ekonomicheskie nauki = The Bulletin of the South-Russian State Technical University (NPI). Social and Economic Science*. 2020;13(2):7–27. (In Russ.). DOI: 10.17213/2075–2067–2020–2–7–27
23. Romano L., Traù F. The nature of industrial development and the speed of structural change. *Structural Change and Economic Dynamics*. 2017;42:26–37. DOI: 10.1016/j.strueco.2017.05.003
24. Vu K.M. Structural change and economic growth: Empirical evidence and policy insights from Asian economies. *Structural Change and Economic Dynamics*. 2017;41:64–77. DOI: 10.1016/j.strueco.2017.04.002
25. Iamsiraroj S. The foreign direct investment — economic growth nexus. *International Review of Economics & Finance*. 2016;42:116–133. DOI: 10.1016/j.iref.2015.10.044

ABOUT THE AUTHOR

Oleg S. Sukharev — Dr. Sci. (Econ.), Prof., Chief Researcher, Institute of Economics, Russian Academy of Sciences, Moscow, Russia
o_sukharev@list.ru

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The Impact of Financial Capital on Innovative Behavior of Industrial Companies

A.V. Trachuk[a] ✉, **N.V. Linder**[b]
Financial University, Moscow, Russia
[a] https://orcid.org/0000-0003-2188-7192; [b] https://orcid.org/0000-0002-4724-2344
✉ Corresponding author

ABSTRACT

The authors empirically assessed the impact of the availability of industrial companies to financial capital on their innovative behavior. **The relevance** of the study is due to the need to develop new analysis tools and stimulate the innovative development of industrial companies in an unfavorable external environment**. The aim** of the study is to assess the relationship between the availability of financial capital for industrial companies and the possibility of transforming their innovative behavior into a more advanced innovative regime. The authors applied **the method** of regression analysis of survey data in 648 Russian industrial companies for 2015–2019 to test the three following hypotheses: 1. The financial performance of industrial companies depends on the model of innovative behavior; 2. Financial capital has a significant positive effect on the choice of a more advanced innovative behavior and on the performance of industrial companies; 3. Different availability restrictions to financial capital have a different impact on the choice of innovative behavior and the performance of industrial companies. The authors analyzed two types of restrictions on financial capital: light, when the rate of return from the company's activities is below the lending interest rate; and strict, when the company does not have access to the credit market. The authors proved that the choice of a particular model of innovative behavior depends on the availability of financial capital of industrial companies. **The conclusion** is that different types of financial capital constraints affect the choice of a model of innovative behavior in different ways. The authors suggest allocating resources for innovation, development and launch of new products on the market even in conditions of limited access to financial capital. Alternatively, in the context of extremely limited financial capital, it is to develop imitation innovations in new or existing markets.

Keywords: financial capital; liquidity restriction; innovative behavior; efficient producers; value innovators; technological innovators; radical innovators; imitators; industrial companies

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INTRODUCTION

Research on the growth of the world's leading economies confirms the key role of innovation in social and economic progress. Numerous studies have proven that the creation and implementation of innovations are the key intracompany capabilities that build an unbeatable competitive advantage [1, 2]. Besides, developing innovative activities of companies is an important factor of internationalisation of an enterprise, as well as overcoming unfavorable conditions of the external economic environment, the recent subject of many studies (for example, [3–5]). To achieve the best results, companies follow different principles and models of behavior and management of innovation, allocate resources in different ways, and thus build their own line of innovative behavior [6].

Empirical research and microdata analysis make it possible to identify features for classifying innovative behavior and clearly identify innovative modes in industry. Thus, the characteristics of innovative behavior classification most often include: the type of innovations, the intensity of investments in research and development, the level of novelty of innovations, the presence of knowledge generation processes [7]. To analyze the types of innovations, one is most often guided by the Oslo Guide. The novelty is determined relative to the international market (not the company itself). The knowledge creation process is defined as insource research and development. Most studies ground their classification on: their own research and development, cooperation in the implementation of innovative projects, the availability of patents, and the dissemination of knowledge [8].

There are currently enough empirical works confirming the possibility to identify stable types of innovative behavior (for example, the works by T. Hatzichronoglou [9], K. Pavitt [10], A. Pyka, R. Nelson [11], F. Malerba, R. Nelson, L. Orsenigo, S. Winter [12], J. Van den Bergh [13], L. Faria, M. M. Andersen [14].

However, most authors analyzed the microdata of companies operating in conditions of economic stability that do not consider the impact of access to financial capital on the transformation of the innovative behavior of industrial companies. Currently, Russian industrial companies operate under the sanctions against Russia, which constraint companies' access to the most valuable resources, including financial capital [15]. The choice of innovative behavior is usually determined by the availability and accessibility of industrial companies to financial capital. The study of its role will determine whether a company will be able to transform its innovative behavior and move to a more advanced level.

This article attempts to address the following research questions:

1) which of the types of innovative behavior provides the greatest performance for industrial companies in the context of limited access to financial capital?

2) how does restricting access to financial capital affect the choice of a model of innovative behavior and company performance?

3) what types of liquidity constraints most affect the transformation of the innovative behavior of industrial companies?

We tested the generated research model on data collected during the period of sanctions imposed on the Russian economy and restrictions on access to resources, including financial capital (2015–2019). The empirical analysis is based on a survey of 648 industrial companies.

LITERATURE REVIEW

Types of innovative behavior of industrial companies

According to the behavioral theory of a firm, a strategy is a "stable model of behavior or

a pattern in a stream of decisions" [16]. The rules and principles followed by managers when implementing an innovation strategy to increase the results of innovative activities determine the innovative behavior of a company.

A group of companies with similar characteristics of innovative behavior forms an innovative (in some studies, technological [11, 13]) regime in the economic sector, which is "a tool for analyzing the diversity of innovative and competitive behavior of firms" [13]. Among the first was the classification of innovation regimes by the Organization for Economic Cooperation and Development (OECD), based on the level of technology of the sectors: high-, medium- and low-tech sectors [9]. The OECD study shows that companies in high-tech industries invest more in research and development, more often enter international markets, have higher performance indicators, and thus stimulate the development of related industries [9]. The researchers believe that high-tech industries are the engines of innovative economic growth. After 20 years of research, collecting information and analysis of radical differences in innovation behavior in different sectors, two distinct subgroups have been identified in the medium-tech sector: high and low.

K. Pavitt [10] developed the theory of innovative behavior that for the first time in the analysis used indicators of innovation introduction in companies. They showed a certain trajectory of the technological development of the company. Based on the analysis of 26 industries, Pavitt identified three types of innovation regimes based on the type of innovative behavior:

- science based companies that have a high share of investments in research and development in revenue, creating numerous cooperative relationships in the implementation of innovative projects (with universities, centers engaged in fundamental and applied scientific research);
- production intensive including two groups of companies: 1) "scale intensive", focused on the implementation of technological innovations to reduce costs; and 2) "specialized suppliers" with a lower intensity of investment in research and development and aimed at introducing product innovation;
- supplier dominated companies that do not generate knowledge on their own, but provide demand for new technologies, i.e. stimulate the development of innovation-oriented companies in related industries [10].

Pavitt proved the hypothesis of the need to develop supporting industries that do not generate knowledge on their own, but stimulate the dissemination of new knowledge and technologies and thus affect economic growth.

A further development of the theory of innovative regimes was its focus on the level of national economies and industries. This made it possible to identify completely new types of innovative behavior:

- "technology users" (similar to Pavitt's "supplier dominated" type) [17];
- "technical consultancy" focused on the "generation and distribution of specific technological innovations" [17].

L. M. Gokhberg, T. E. Kuznetsova and V. A. Rud' [18] based on the data of 30.8 thousand Russian companies in the extractive, manufacturing, electricity, gas and water production, innovative modes were identified based on a certain type of companies' innovative behavior:

- "innovators in the international market";
- "innovators in the national/local market";
- "imitators on the international market";
- "imitators on the national/local market";
- "technological borrowing";
- "unfinished innovations" [18].

Another work by Russian authors, devoted to the modes of innovation activities of companies in the sector of intellectual services, based on the analysis of 477 Russian companies, identifies six clusters of companies:

- "innovative-passive";
- "organization-oriented";
- "marketing-oriented";
- "non-technological";
- "technological";
- "diversified innovators" [19].

In our work [20], we identified the following types of innovative behavior of industrial companies:

– *efficient producers* are the companies whose innovative strategies aim to introduce process and technological innovations to increase the effectiveness of operating activities. Investments in equipment and production, process innovations and improvement of infrastructure occupy a dominant share in the structure of costs for innovation activities. The costs of marketing and organizational innovation are extremely low. This model of innovative behavior prevails among companies in labor-intensive and capital-intensive industries, for example, textiles, woodworking, oil and gas industries, metallurgy, machinery and equipment. Building a corporate innovation system and specifics of the innovation process of these companies are determined by the changes necessary to improve production processes and products aimed at reducing costs while maintaining or improving product quality. The innovative behavior of these companies is characterized by innovative approaches to the development and implementation of new products, the introduction of organizational innovations in order to reduce administrative or operational costs, increase the productivity of workplaces, reduce supply costs, manage logistics systems, a developed system of interfirm relationships that contribute to effective interaction of companies with suppliers, customers, manufacturers and end users [20];

- *technological innovators* are the innovative strategies of companies of this type are aimed at creating and developing new products, due to the integration of technologies with partners along the value chain. In the structure of costs for innovation, costs for research and development prevail, accounting for an average of 3–10% of gross revenues; the product life cycle of these companies is from 3 to 10 years. This innovative regime dominates among the industries of mechanical engineering, electric power engineering, and production of building materials. To succeed, innovative strategies of companies of this type include the development of professional training among employees, ensuring the protection of intellectual property, patenting inventions, creating partnerships aimed at accessing global sources of new knowledge and technologies, highly qualified personnel [20];

- *value innovators* are the innovative strategies of companies of this type are aimed at creating the highest value for customers and optimizing the delivery ways, while ensuring the proposal of new products, services and the formation of alternative business models. Companies of this type of innovative behavior aim to get to know their consumer in order to increase the consumer value of goods, reduce consumer operating costs, and find new markets. This innovative regime is typical, for example, for the food, clothing, and textile industry. In the structure of costs for innovation activities, costs for marketing innovations prevail (about 3–7% of gross revenue). The innovation cycle is characterized by a relatively short development period for new products. Since the products and services of companies of this innovative regime are

largely focused on consumers of national/local markets, in the development and implementation of innovations, national companies can have advantages over global players. Building an innovation system and specifics of the innovation process are determined by the possibilities of entering new markets, the presence of market niches with unsatisfied consumer needs where the company could succeed. The key success factors for implementing this strategy are: the ability to develop new sales markets, the ability to quickly scale up the production of innovations and refine products after their launch. Besides, the presence of domestic demand for innovations and measures to support entrepreneurship has a positive effect on the performance of these companies [20];

- *radical innovators* are the innovative strategies of companies of this type built on the commercialization of fundamental research by creating new products on their basis. Research and development costs account for the largest share in the structure of costs for innovation activities (on average, 15% to 35% of gross proceeds from sales). Due to the fact that the innovation process includes fundamental and applied research, its duration is also relatively long — about 5–20 years. To implement an innovative strategy, companies of this type are building an extensive network of partnerships with research centres, universities, and consulting companies. In Russia, the radical innovators regime is most widespread among the petrochemical industries, enterprises of the military-industrial complex, and the pharmaceutical industry. The factors contributing to the successful implementation of these industries are: legal protection of intellectual property, which guarantees companies profit from the sale of new products based on their inventions; stimulating tax policy; patent activity; access to international markets [20];
- *imitators* are the companies that do not participate in creating and disseminating of new knowledge and products in the market, since they do not have the resources to conduct their own research and development or to innovate. The imitation strategy allows companies to learn from market leaders, compete, and develop their own research and development competencies. The scientific literature defines three types of imitation strategies: "copying the entire product"; "copying individual technical parameters, design and brand elements, borrowing innovative solutions (technologies, patents, knowledge, business processes, management principles and business models)"; "creative imitation, when a company makes changes to an original innovation or finds a new application, as a result of which it creates a new product, process, technology" [21]. Under certain conditions, imitation strategies, can also help create sustainable competitive advantage and improve business performance.

Effect of financial capital on innovative behavior of industrial companies

Financial capital is an essential resource for implementing innovative strategies and, therefore, the choice of innovative behavior by industrial companies. Availability and access to financial capital for efficient producers makes it possible to improve infrastructure and introduce new technologies to improve product quality while reducing costs; for technological innovators, to experiment more with the development of new products and to implement new projects in the field of technology integration with partners along the value chain without reducing resources; for value innovators, the access to financial capital allows for a deeper survey of consumers and their needs and requirements, systematically tracking changes, while measuring their satisfaction; radical

innovators who possess financial capital, have more opportunities to conduct research and development, and, consequently, to commercialize their results; imitators will be able to search for new products and services that the market needs, as well as to assess the possibilities of adapting new products to market requirements or full imitation.

The accumulated empirical studies have shown that restrictions of access to financial capital (in some studies — liquidity restriction, for example, [22]) adversely affects research and development [23], the effectiveness of innovation [22, 24]. However, there is no consensus regarding the importance of own sources or external financing of innovative activities. Thus, works [25, 26] substantiated that external financing has a more obvious positive effect on innovation among high-tech companies, while for medium- and low-tech firms, their own sources of financing are of greater importance.

Work [27] shows that, given the limited equity capital, only external financing can guarantee continuous investment in innovation for companies in all industries.

Work [28], on the contrary, substantiated a significant positive effect of equity capital for financing innovative activities.

At the same time, different types of liquidity restrictions have different effects on the effectiveness of innovation activities.

Thus, this review allows for the following hypotheses:

Hypothesis 1: The financial performance of industrial companies depends on the model of innovative behavior, while a combination of models of innovative behavior will allow achieving the highest possible performance results.

Hypothesis 2: Financial capital has a significant positive effect on the choice of a more advanced innovative type of behavior and the effectiveness of innovation.

Hypothesis 3: Different types of restrictions on access to financial capital have different effects on the choice of innovative behavior and the performance of industrial companies.

In this study, we will consider two types of restrictions on access to financial capital: soft, when the rate of return on the company's activities is below the lending interest rate, and rigid, which assumes that the company does not have access to the credit market.

Fig. 1 presents the theoretical research model developed by the authors.

USED DATA AND RESEARCH METHODS

Research sampling

Data on industrial companies was collected for the period from 2015 to 2019, characterized by increased economic sanctions against Russia, deterioration of macroeconomic indicators, loss of the value of the national currency, deterioration in business activity, a noticeable decline in investment in all industries and, as a result, access for industrial companies to financial capital.

For the empirical analysis, we selected 648 industrial companies with over 250 people each. 28% of the selected companies are exporters and operate in global markets. More than 40% of the companies conduct independent research and development (R&D). The average share of sales proceeds directed to R&D is 5.5%. About 10% of the companies have joint research projects.

Research variables

Three groups of indicators were used as *dependent variables*, each of them was assessed on a 7-point scale, where 1 stands for "the indicator has significantly decreased", 4 stands for "the indicator has not changed", and 7 stands for "the indicator has significantly increased":

- financial performance indicators: sales proceeds, profitability of sales;
- indicators of the effectiveness of innovation: revenue from sales of new

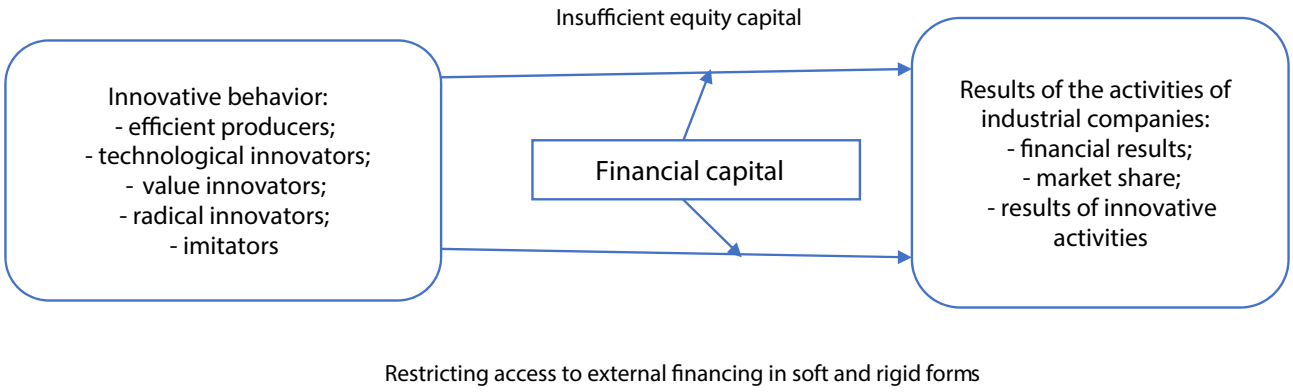

Fig. 1. **Theoretical research model**

Source: compiled by the authors.

products, the availability of investments in research and development, the availability of patents;

• market indicators: market share, incremental value for customers.

Subjective performance indicators are often used in management research (for example, [29, 30]), due to the fact that objective results vary greatly depending on the industry, while subjective indicators reflect the dynamics of changes from the point of view of the company's management. Besides, works [31, 32] confirmed the correlation between subjective and objective assessments. Therefore, subjective indicators are justified and can be considered reliable.

Independent variables — to assign industrial companies to a particular innovation regime, we developed a scale, consisting of questions to measure the "gravitation" of a company to one or another innovative behavior: the presence of its own R&D departments, the level of innovation novelty, the structure of investments in innovative activities, investments in research and development, conducting fundamental research by own resources, working in international markets, the duration of the innovation cycle, the use of open innovation tools. Based on these indicators, we divided industrial companies into five innovative regimes: efficient producers; technological innovators; value innovators; radical innovators; imitators.

Control variables — the performance of industrial companies varies significantly depending on the industry, the size of the company, its age, which became the control variables. The industry variable is accounted for as a dummy variable denoting "1" if the company belongs to the industry, and "0" otherwise.[1] A firm's age is measured by its age, and its size is measured by the average number of employees. We transformed all variables using the natural logarithm, which allows the assumption of a normal distribution to be met.

EMPIRICAL RESULTS

To achieve the aim of the study, we first analyzed the data for reliability and validity using confirmatory factor analysis (CFA). We assessed the quality of the models with statistical indicators that allow establishing

[1] Classification of industries: food production, including beverages and tobacco products; textile and clothing production; production of leather, leather goods and footwear; wood processing and production of wood products; pulp and paper production; publishing and printing activities; chemical production; manufacture of rubber and plastic products; manufacture of other non-metallic mineral products; metallurgical production and production of finished metal products; manufacture of machinery and equipment; production of electrical equipment, electronic and optical equipment; production of vehicles and equipment; production and distribution of electricity, gas and water; exploration and extraction of minerals.

Table 1

Results of reliability and validity of measurement models

Measurement models	Cronbach's alpha	Reliability statistics
First order models		
Industrial results	0.782 to 0.921	χ^2/df = 2.004; GFI = 0.871; CFI = 0.883; AGFI = 0.862; TLI = 0.913; RMSEA = 0.034
Financial capital availability	0.748–0.836	
Second order models		
Efficient producers	0.726 to 0.811	χ^2/df = 1.994; GFI = 0.822; CFI = 0.901; AGFI = 0.879; TLI = 0.934; RMSEA = 0.041
Infrastructure improvement costs	0.711 to 0.876	
Costs of introducing new technologies	0.735 to 0.884	
Process innovation costs	0.773 to 0.825	
Improving the quality of products	0.716 to 0.939	
Technological innovators	0.854 to 0.983	χ^2/df = 1.873; GFI = 0.808; CFI = 0.829; AGFI = 0.849; TLI = 0.962; RMSEA = 0.039
Availability of patents	0.725 to 0.873	
Research and development costs	0.902 to 0.955	
Development and implementation costs of new products	0.889 to 0.942	
Staff training costs	0.819 to 0.908	
Value innovators	0.854 to 0.983	χ^2/df = 1.833; GFI = 0.819; CFI = 0.805; AGFI = 0.822; TLI = 0.911; RMSEA = 0.036
Marketing innovation costs	0.751 to 0.893	
Development and implementation costs of new products	0.774 to 0.886	
Number of new products introduced to the market	0.716 to 0.908	
Radical innovators	0.854 to 0.983	χ^2/df = 1.917; GFI = 0.842; CFI = 0.854; AGFI = 0.866; TLI = 0.906; RMSEA = 0.042
Share of revenue from export of new products	0.809 to 0.916	
Availability of patents	0.761 to 0.829	
Basic research costs	0.779 to 0.889	
Applied research costs	0.902 to 0.955	
Development and implementation costs of new products	0.889 to 0.942	
Share of products new to the world	0.819 to 0.908	
Imitators	0.828 to 0.915	χ^2/df = 1.995; GFI = 0.831; CFI = 0.878; AGFI = 0.819; TLI = 0.947; RMSEA = 0.038
Cost of copying entire products	0.889 to 0.926	
Copying costs of individual technical parameters	0.877 to 0.907	
Cost of performing a creative imitation	0.819 to 0.948	

Note: * — $p < 0.001$.

Source: compiled by the authors.

Table 2

Analysis of the reliability and validity of the variables used in the model

	Variable	Cronbach's alpha	Composite reliability	Average variance extracted	1	2	3	4	5	6	7
1	Efficient producers	0.838	0.82	0.68	0.68						
2	Technological innovators	0.857	0.79	0.71	0.179	0.71					
3	Value innovators	0.884	0.75	0.73	0.227	0.294	0.73				
4	Radical innovators	0.902	0.90	0.59	0.110	0.019	0.029	0.59			
5	Imitators	0.902	0.90	9.65	0.022	0.008	0.017	0.059	0.65		
6	Financial capital	0.654	0.583	0.696	0.284	0.308	0.207	0.113	0.169	0.61	
7	Performance results	0.813	0.72	0.82	0.223	0.054	0.048	0.079	0.134	0.109	0.69

Source: compiled by the authors.

Table 3

Descriptive statistics and correlation matrix

	Variable	Average	Standard англ ное отклонение	Min value	Max value	1	2	3	4	5	6	7	8	9
1	Performance results	6.17	1.18	1	7	1								
2	Access to financial capital	6.85	1.26	4.23	6.95	0.639	1							
3	Company size	4.8	1.14	1.49	6.3	0.74	0.187	1						
4	Company age	5.51	1.15	1.23	10.2	–0.044	0.105	0.148	1					
5	Efficient producers (EP)	4.75	1.08	1.03	7.47	0.036	0.139	0.084	0.039	1				
6	Technological innovators (TI)	2.74	1.01	0.01	4.78	0.407	0.438	0.217	0.439	0.509	1			
7	Value innovators (VI)	4.56	1.03	1.02	7.05	0.502	0.519	0.377	0.156	0.472	0.442	1		
8	Radical innovators (RI)	6.07	1.06	1.04	6.99	0.278	0.212	0.274	0.103	0.513	0.567	0.372	1	
9	Imitators (IM)	6.54	1.05	1.03	7.12	0.179	0.198	0.182	0.116	0.438	0.471	0.589	0.43	1

Note: n = 648.

Source: compiled by the authors.

the correspondence between the calculated and modeled indicators.[2] *Table 1* shows the results.

The significance of the variables is confirmed by the Cronbach's alpha, whose threshold value should at least be 0.7. In this case, all variables have values from 0.711 to 0.921, which confirms the reliability of measurements. Further, to assess the consistency of the constituent components of second-order variables, we used the average variance explained (*AVE*[3]) indicator, whose threshold value should exceed 0.5 [33]. For all variables, the value turned out to be higher than the norm. *Table 2* presents the results.

We used the Harman's test to estimate the total bias error, since we obtained the variables using the subjective opinions of the same respondents. The results of applying the method of principal components showed the presence of nine principal components, whose values are greater than 1, and none of which accounted for more than 50% of the variance. Therefore, there is no overall estimate of the bias. We calculated the values of all variables as the arithmetic mean of the answers to this question on the scale. For the models of innovative behavior, we first calculated the means for each dimension, and then the mean over the constituent elements. *Table 3* presents the results.

Correlation analysis showed a fairly high correlation relationship between models of innovative behavior: efficient producers and technological innovators, value innovators and imitators, technological innovators and disruptive innovators, as well as efficient producers, technological innovators and radical innovators. There is a lack of correlation between other models of innovative behavior. Therefore, to reduce multicollinearity, the model includes double and triple cross variables.

At the second stage, using linear regression, we analyzed the relationship between innovative behavior, restrictions on access to capital, and company performance. The empirical study included step-by-step analysis:

- Stage 1 (Model 1): analysis of the base model and control variables;
- Stage 2 (Model 2): analysis of the basic model and direct effects of the choice of innovative behavior by companies (efficient producers; technological innovators; value innovators; radical innovators; imitators);
- Stage 3 (Model 3–5): double cross variable analysis (efficient producers and technological innovators (Model 3), value innovators and imitators (Model 4), technological innovators and radical innovators (Model 5);
- Stage 4 (Model 6): triple cross variable analysis (efficient producers, technological innovators and radical innovators).

To make sure there is no multicollinearity of the constructed models, we used the variance inflation factors (*VIFs*) indicator. In all cases it did not exceed 4.5 (with a standard of 10), therefore, there is no multicollinearity in the studied models. *Table 4* presents the results.

As we see, the greatest performance results are achieved by companies that choose models of innovative behavior by efficient producers ($b = 0.0129$, $p < 0.05$), value innovators ($b = 0.0158$, $p < 0.05$), and imitators ($b = 0.0167$, $p < 0.05$). In this case, the greatest results are achieved by imitators who have proceeds from export activities, i.e. operating in the international

[2] For the analysis, we used the approach tested in [36]: "χ^2/df is the general indicator of the model's quality (threshold value < 2 (3); GFI (goodness of fit index) is the fit index (threshold value > 0.9); CFI (comparative fit index) is the comparative fit index (threshold value > 0.9); AGFI (adjusted goodness of fit index) is the adjusted fit index (threshold value > 0.9); TLI (Tucker-Lewis index) is the comparative Tucker-Lewis index (threshold value> 0.9); RMSEA (root mean square error of approximation) is the squared average error of approximation (threshold value < 0.08)".

[3] Calculated by the formula: sum of squares of standardized loads / (sum of squares of standardized loads + sum of measurement errors).

Table 4

Results of the analysis of the relationship between financial capital, innovative behavior and performance in a general sample of industrial enterprises

Research variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Control variables						
Research and development costs	0.0067*** (0.0016)	0.0049*** (0.0019)	0.0054*** (0.0024)	0.0097*** (0.0022)	0.0057*** (0.0017)	0.0069*** (0.0022)
Technology purchase costs	0.0045*** (0.0026)	0.0058*** (0.0019)	0.0067*** (0.0019)	0.0074*** (0.0028)	0.0063*** (0.0039)	0.0089*** (0.0044)
Costs of machinery and equipment	0.0058*** (0.0013)	0.0074** (0.0029)	0.0099*** (0.0035)	0.0088*** (0.0019)	0.0052*** (0.0018)	0.0116*** (0.0014)
Other costs of technological innovation	0.0083*** (0.0018)	0.0065*** (0.0017)	0.0072*** (0.0021)	0.0084*** (0.0032)	0.0093*** (0.0018)	0.0059*** (0.0033)
Training	0.0031*** (0.0017)	0.0054*** (0.0018)	0.0049*** (0.0026)	0.0052*** (0.0015)	0.0073*** (0.0019)	0.0046*** (0.0028)
Marketing innovation costs	0.0054*** (0.0016)	0.0068** (0.0022)	0.0027*** (0.0027)	0.0042** (0.0037)	0.0053 (0.0014)	0.0079*** (0.0019)
Company size	0.0028*** (0.0011)	0.0034*** (0.0009)	0.0029*** (0.0015)	0.0037*** (0.0016)	0.0041 (0.0023)	0.0016*** (0.0014)
Company age	−0.0124** (0.0051)	−0.0153*** (0.0069)	−0.0125** (0.0075)	−0.0167*** (0.0063)	−0.0183*** (0.0082)	−0.0195** (0.0091)
Financial capital	0.0297*** (0.0032)	0.0213*** (0.0052)	0.0199*** (0.0037)	0.0187*** (0.0028)	0.0171*** (0.0035)	0.0224*** (0.0041)
Export proceeds	0.0153*** (0.0028)	0.0149*** (0.0037)	0.0191*** (0.0044)	0.0176*** (0.0045)	0.0173*** (0.0048)	0.0184** (0.0014)
Industries	INC	INC	INC	INC	INC	INC
Basic variables						
Efficient producers (EP)		0.0129*** (0.0047)	0.0148*** (0.0061)	0.0139*** (0.0052)	0.0146*** (0.0057)	0.0169*** (0.0046)
Technological innovators (TI)		−0.0008*** (0.0048)	−0.0026*** (0.0044)	−0.0081*** (0.0052)	−0.0069*** (0.0065)	−0.0038*** (0.0075)
Value innovators (VI)		0.0158*** (0.0024)	0.0136*** (0.0021)	0.0178*** (0.0032)	0.0151** (0.0039)	0.0191*** (0.0057)
Radical innovators (RI)		−0.0024*** (0.0022)	−0.0059*** (0.0031)	−0.0093*** (0.0042)	−0.0086*** (0.0037)	−0.0046*** (0.0016)
Imitators (IM)		0.1067*** (0.0026)	0.0182*** (0.0035)	0.0174** (0.0028)	0.0198*** (0.0026)	0.0106** (0.0044)
Double cross variables						
EP × TI			−0.0217*** (0.055)			−0.0012*** (0.0033)
TI × RI				−0.0162*** (0.0029)		−0.0071*** (0.034)
VI × IM					−0.0179*** (0.0082)	−0.0167*** (0.0059)
Triple cross variable						
EP × TI × RI						−0.0068*** (0.0037)
Constant	1.442*** (0.351)	2.589** (0.475)	2.981*** (0.644)	3.058 *** (0.392)	2.533*** (0.489)	3.062*** (0.358)
F-statistics	42.12***	38.17***	29.87***	34.83***	35.28***	31.56***
$R2\ adj.$	0.18	0.15	0.16	0.15	0.18	0.17

Note: n = 648; standard errors are in brackets; *** – $p < 0.001$; ** – $p < 0.05$.

Source: compiled by the authors.

market. Increasing research and development costs are driving companies towards a more advanced innovation regime. Investments in new technologies and equipment stimulate innovation and have a greater impact on the effectiveness of innovation.

Value innovators have a negative effect on the effectiveness of innovation, but has a stronger positive relationship with the financial results of industrial companies. The industry specificity on the choice of innovative behavior has an effect only for imitators and value innovators. The test result of 3–5 models indicates a negative relationship between the combination of innovative behavior models and performance results (EP × TI: b = –0.0217, p < 0.10; TI × RI: b = –0.0162, p < 0.05; VI × IM: b = –0.0179, p < 0.10). The effects of a triple combination of innovative strategies do not affect the performance of industrial companies (when analyzing a general sample — (Model 6). Focusing a company on one type of innovative behavior gives more significant results than following mixed strategies of innovative behavior.

Thus, Hypothesis 1 is confirmed. The chosen type of innovative behavior really affects the performance of industrial companies.

Hypothesis 2 about the effect of financial capital is also confirmed, and the presence of financial capital has a statically significant positive effect with the maximum level of significance (b = 0.0297, p < 0.05).

To test Hypothesis 3, we divided the total sample of Russian industrial companies into three subsamples according to the level of financial capital limitation:

- companies with sufficient financial capital and not experiencing liquidity restrictions;
- companies experiencing liquidity restrictions *due to the high cost of loan capital*. This group includes companies whose return[4] on invested capital was below the average interest rate on loans. This situation in the long term leads to unprofitable core activities, but we are interested in changing the behavior of companies, whether they can turn the tide through innovations and achieve an increase in the return on investment or their innovative behavior will be inclined to use a strategy of imitation;
- companies experiencing liquidity restrictions *due to poor financial condition* and therefore, they do not have access to the capital market. To select companies in this category, we used a normative approach to determining financial condition, which consists in comparing the calculated financial indicator with the normative value, just as in work [33]. If the value of a particular indicator was outside the range of the normative value, then it was assumed that the financial position of the company was poor and it was experiencing liquidity restrictions due to the inability to access the capital markets. The sample includes those companies that have at least two coefficients below the standard.

For each subsample, we carried out a regression analysis in several steps (a total of 6 Models), similar to the analysis of the general sample. *Table 5* presents the results.

The results of the analysis show that the models of innovative behavior of technological innovators and radical innovators have a positive relationship only in the group of companies that do not lack financial capital. For the other two subgroups in the sample that experience restrictions on access to financial capital, these models of innovative behavior do not have a significant result on the performance of industrial companies (b = –0.0065, p < 0.05; b = –0.0053, p < 0.10).

In the subgroup of companies experiencing liquidity restrictions due to

[4] In this case, the return on invested capital (ROIC) is understood as the ratio of net operating income to the average for the period of equity and long-term borrowed capital.

Table 5

Results of regression analysis of three sample industrial companies by restrictions on access to financial capital

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Control variables	INC	INC	INC	INC	INC	INC
Companies without liquidity restrictions						
Basic variables						
Efficient producers (EP)		0.0211*** (0.042)	0.0195** (0.048)	0.0189*** (0.039)	0.0206*** (0.028)	0.0178*** (0.035)
technological innovators (TI)		0.0177*** (0.0016)	0.0158*** (0.0019)	0.0161*** (0.0017)	0.0182*** (0.0045)	0.0108*** (0.0038)
Value innovators (VI)		0.0157*** (0.0039)	0.0132** (0.0051)	0.0183*** (0.0047)	0.0191*** (0.0104)	0.0164*** (0.0058)
Radical innovators (RI)		0.0305*** (0.0022)	0.0312*** (0.0018)	0.0289*** (0.0031)	0.0296*** (0.0065)	0.0321*** (0.0027)
Imitators (IM)		0.0109*** (0.0015)	0.0112*** (0.0044)	0.0123*** (0.0038)	0.0162*** (0.0101)	0.0164*** (0.0063)
Double cross variables						
EP × TI			0.0207*** (0.029)			0.0194*** (0.022)
TI × RI				0.0349*** (0.0042)		0.0411*** (0.0028)
VI × IM					0.0166*** (0.0051)	0.0193*** (0.0042)
Triple cross variable						
EP × TI × RI						– 0.0083** (0.0124)
Constant	1.442*** (0.351)	2.589*** (0.475)	2.981*** (0.644)	3.058*** (0.392)	2.533*** (0.489)	3.062*** (0.358)
F–statistics	37.22	34.19	28.79	36.91	41.18	36.33
*R*2 adj.	0.18	0.17	0.17	0.15	0.14	0.15
Companies experiencing liquidity restrictions due to the high cost of loan capital						
Basic variables						
Efficient producers (EP)		0.0269*** (0.0021)	0.0256*** (0.0032)	0.0282*** (0.0034)	0.0251*** (0.0036)	0.0268*** (0.0035)
Technological innovators (TI)		–0.0065*** (0.0031)	–0.0084** (0.0045)	–0.0069*** (0.0039)	–0.0046*** (0.0042)	–0.0111*** (0.0027)
Value innovators (VI)		0.0228*** (0.0022)	0.0231*** (0.0014)	0.0228*** (0.0025)	0.0219*** (0.0018)	0.0233*** (0.0031)
Radical innovators (RI)		–0.0053*** (0.0038)	–0.0131*** (0.0029)	–0.0148*** (0.026)	–0.0139** (0.019)	–0.0153** (0.034)
Imitators (IM)		0.0313** (0.0034)	0.131*** (0.024)	0.128*** (0.026)	0.119*** (0.019)	0.133*** (0.034)
Double cross variables						
EP × TI			–0.0193*** (0.0069)			–0.0066** (0.0021)

Table 5 (continued)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
TI × RI				−0.0141*** (0.038)		− 0.0136*** (0.038)
VI × IM					0.0184** (0.0027)	0.0199*** (0.0053)
Triple cross variable						
EP × TI × RI						−0.0072** (0.013)
Constant	2.012*** (0.371)	2.009*** (0.384)	2.481*** (0.512)	1.005*** (0.447)	3.443*** (0.316)	2.562*** (0.339)
F−statistics	34.63	35.23	31.28	34.11	32.54	33.88
*R*2 adj.	0.16	0.16	0.15	0.16	0.15	0.17
Companies experiencing liquidity restrictions due to poor financial condition						
Basic variables						
Efficient producers (EP)		−0.1068*** (0.0033)	−0.0195*** (0.0037)	−0.0159*** (0.0032)	−0.0171*** (0.0502)	−0.0055*** (0.0032)
Technological innovators (TI)		−0.0098*** (0.0011)	−0.0083*** (0.0024)	−0.0092** (0.0028)	−0.0146*** (0.0304)	− 0.0169*** (0.0027)
Value innovators (VI)		−0.0126** (0.0032)	−0.0138*** (0.0027)	−0.0118*** (0.0031)	−0.0182*** (0.0026)	−0.0149*** (0.0039)
Radical innovators (RI)		−0.0192*** (0.0033)	−0.0169*** (0.0037)	−0.0174** (0.0032)	−0.0136*** (0.0052)	−0.0079** (0.0032)
Imitators (IM)		0.0179*** (0.0033)	0.0188*** (0.0069)	0.0171*** (0.0055)	0.0163*** (0.0057)	0.0154*** (0.0081)
Double cross variables						
EP × TI			− 0.016*** (0.0028)			− 0.0172** (0.062)
TI × RI				−0.0173*** (0.0004)		− 0.0085*** (0.029)
VI × IM					−0.0169*** (0.0029)	− 0.0108*** (0.0049)
Triple cross variable						
EP× TI × RI						−0.0065*** (0.0013)
Constant	2.371*** (0.279)	3.008*** (0.319)	2.173*** (0.429)	2.993*** (0.284)	1.486*** (0.319)	2.108*** (0.402)
F−statistics	31.59	33.26	37.29	38.42	35.44	32.37
*R*2 adj.	0.16	0.15	0.15	0.16	0.15	0.17

Note: n = 648; standard errors are in brackets; *** – $p < 0.001$; ** – $p < 0.05$.

Source: compiled by the authors.

the high cost of loan capital, the greatest positive relationship with performance is only in the companies that have chosen the model of innovative behavior "efficient producers" (b = 0.0269, p < 0.05), "value innovators" (b = 0.0228, p < 0.05) and "imitators" (b = 0.0313, p < 0.05). Consequently, companies have no incentive to choose a more advanced model of innovative behavior.

In the subgroup of companies experiencing liquidity restrictions due to poor financial condition, only one model of innovative behavior, "imitators" (b = 0.0192, p < 0.05), is positively associated with the performance of industrial companies

Following mixed strategies of innovative behavior (Models 3–5) positively affects the performance of industrial companies only in the subgroup of companies that are not experiencing liquidity restrictions.

Also, different types of liquidity restrictions have a different effect on mixed strategies: in the subgroup of companies experiencing soft liquidity restrictions, the mixed strategy of value innovators and imitators has a positive relationship, while in the subgroup of companies experiencing hard liquidity restrictions, all types of mixed strategies have an insignificant relationship with company performance.

Thus, industrial companies will choose more advanced strategies for innovative behavior only if they do not experience restrictions on access to financial capital.

Adherence to triple models of mixed innovation behavior has a positive relationship with performance also only in the subgroup of companies that do not lack funding. For the other two subgroups, triple mixed strategies of innovative behavior have a negative relationship with performance.

Thus, Hypothesis 3 is confirmed: sufficient financial capital helps companies expand their innovative capabilities and support the development of both two and three mixed strategies of innovative behavior. Different types of financial restrictions have different effects on innovative behavior: soft restrictions allow the development of dual strategies, for example, value innovators and imitators. They also allow the selection of more advanced models of innovative behavior, i.e. move from "imitators" to "value innovators" or "efficient producers", while restricting access to capital in a rigid form has only one model of innovative behavior, which is positively related to the performance of industrial companies and does not allow the transition to more advanced innovative modes.

CONCLUSIONS

Financial capital is a strategically important resource that affects developing certain models of innovative behavior and the performance of industrial companies. The current research gives a new insight on the relationship between the chosen model/combination of models of innovative behavior and the performance of industrial companies in the context of restrictions on access to financial capital. The empirical analysis led to the following conclusions. The choice of models of innovative behavior "efficient producers", "value innovators" and "imitators" when these companies operate in the international market has the greatest effect on financial performance. On the contrary, the effectiveness of innovation activity is most influenced by "technological innovators" and "radical innovators", and "imitators" and "value innovators" prevent the creation of radical innovations. The availability and access to financial capital of industrial companies affect the choice of an innovative behavior model (with the maximum significance). For example, despite the fact that many studies justify the important role of technological and radical innovators [34], our study shows a positive relationship between these models

of innovative behavior and performance only for companies that are not experiencing liquidity restrictions. Besides, for these companies, focusing on a combination of innovative behavior patterns is positively associated with performance, with a combination of technological innovators and radical innovators showing the strongest link and enabling companies to benefit from complementarities. The combination of the three strategies of innovative behavior does not give a positive effect even for companies not experiencing liquidity restrictions. It is likely that the combination of the three models of innovative behavior creates difficulties in attracting resources, which undermines the company's ability to develop and maintain several models of innovative behavior at once.

Different types of restrictions on access to financial capital affect the choice of an innovative behavior model and its transformation in different ways.

Thus, for companies experiencing soft restrictions, the greatest positive effect is provided by "efficient producers", "value innovators", and "imitators". It is only the combination of "value innovators" and "imitators" that provides positive effects from the combination of models of innovative behavior. This is likely due to the fact that such strategies require less investment and form a competitive advantage by creating the most value for customers.

For companies experiencing rigid restrictions, only focusing on imitation strategies yields positive results. Rigid restrictions also do not allow for the effects and benefits of complementarities between innovation strategies.

The research results are of practical value for industrial leaders, business owners and entrepreneurs. Even with the limited access to financial capital, the results indicate the need to allocate resources for innovation, development and launch of new products on the market, and access to foreign markets. Developing imitation innovations in new or existing markets is an alternative in the context of rigid liquidity restrictions. Besides, business leaders should be aware of the limitations of combined innovation strategies and their potential negative impact on company performance.

The study is limited by the subjective assessments of the survey participants. In the future, one could use objective data and compare the results. Moreover, we conducted the study on a sample of industrial companies; in the future, the analysis could be extended to other industries. Also, future studies may consider other factors of the internal and external environment, for example, innovation networks and intercompany cooperation, the qualifications of employees engaged in innovative activities, etc., that can affect the relationship between innovative behavior and the company's performance in the context of financial capital restrictions, which will allow for further significant development of the considered problems.

REFERENCES

1. Abdikeev N.M., Bogachev Yu.S., Bekulova S.R. Investment potential of the manufacturing industry. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2019;23(4):24–42. (In Russ.). DOI: 10.26794/2587–5671–2019–23–4–24–42
2. Sapir E.V., Karachev I.A. Challenges of a new investment policy: Investment promotion and protection. *Finansy: teoriya i praktika = Finance: Theory and practice.* 2020;24(3):118–131. (In Russ.). DOI: 10.26794/2587–5671–2020–24–3–118–131
3. Shestak V.P., Moreva E.l., Tyutyunnik I.G. Financial management of innovative activity. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2019;23(6):63–75. (In Russ.). DOI: 10.26794/2587–5671–2019–23–6–63–75

4. Faiazova S. I. Innovation influence on export activities: Empirical analysis of Russian companies. *Strategicheskie resheniya i risk-menedzhment = Strategic Decisions and Risk Management*. 2020;11(1):56–69. (In Russ.). DOI: 10.17747/2618–947X-2020–1–56–69
5. Trachuk A.V., Linder N.V. Innovations and productivity: An empirical study of growth constraints using longitudinal analysis. *Upravlencheskie nauki = Management Sciences in Russia.* 2017;7(3):43–58. (In Russ.).
6. Miles I. A disrupted future? *Foresight and STI Governance*. 2020;14(1):6–27. DOI: 10.17323/2500–2597.2020.1.6.27
7. Desyllas P., Miozzo M., Lee H.-F., Miles I. Capturing value from innovation in knowledge-intensive business service firms: The role of competitive strategy. *British Journal of Management*. 2018;29(4):769–795. DOI: 10.1111/1467–8551.12273
8. Janger J., Schubert T., Andries P., Rammer C., Hoskens M. The EU 2020 innovation indicator: A step forward in measuring innovation outputs and outcomes? *Research Policy*. 2017;46(1):30–42. DOI: 10.1016/j.respol.2016.10.001
9. Hatzichronoglou T. Revision of the high-technology sector and product classification. OECD Science, Technology and Industry Working Papers. 1997;(2). URL: https://www.oecd-ilibrary.org/docserver/134337307632.pdf?expires=1607426322&id=id&accname=guest&checksum=E 01367CEBFB 6EB 387091A90D 98DF7F85
10. Pavitt K. Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy*. 1984;13(6):343–373. DOI: 10.1016/0048–7333(84)90018–0
11. Pyka A., Nelson R. Schumpeterian competition and industrial dynamics. In: Nelson R., Dosi G., Helfat C., Pyka A., Saviotti P., Lee K. et al. Modern evolutionary economics: An overview. Cambridge, New York: Cambridge University Press; 2018:104–142. DOI: 10.1017/9781108661928.004
12. Malerba F., Nelson R., Orsenigo L., Winter S. Innovation and industrial evolution. In: Malerba F., Nelson R., Orsenigo L., Winter S. Innovation and the evolution of industries: History-friendly models. Cambridge: Cambridge University Press; 2016:1–21. DOI: 10.1017/CBO9781107280120.004
13. Van den Bergh J. Technological evolution. In: Van den Bergh J. Human evolution beyond biology and culture: Evolutionary social, environmental and policy sciences. Cambridge, New York: Cambridge University Press; 2018:290–318. DOI: 10.1017/9781108564922.011
14. Faria L., Andersen M.M. Sectoral dynamics and technological convergence: An evolutionary analysis of eco-innovation in the automotive sector. *Industry and Innovation*. 2017;24(8):837–857. DOI: 10.1080/13662716.2017.1319801
15. Laborda J., Salas-Fumás V., Suárez C. An endogenous approach to the cyclicality of R&D investment under credit constraints: Firms' cash flow matters! *Journal of Open Innovation: Technology, Market, and Complexity*. 2020;6(3):33. DOI: 10.3390/joitmc6020033
16. Mintzberg H. Patterns in strategy formation. *Management Science.* 1978;24(9):934–948. DOI: 10.1287/mnsc.24.9.934
17. Beneito P., Rochina-Barrachina M.E., Sanchis-Llopis A. Ownership and the cyclicality of firms' R&D investment. *International Entrepreneurship and Management Journal*. 2015;11(2):343–359. DOI: 10.1007/s11365–014–0320–9
18. Gokhberg L.M., Kuznetsova T.E., Rud' VA. The analysis of innovative modes in the Russian economy: Methodological approaches and first results. *Foresight and STI Governance*. 2010;4(3):18–30.
19. Miles I., Belousova V., Chichkanov N. Modes of innovation companies in the sector of intellectual services. *Foresight and STI Governance*. 2017;11(3):94–102. DOI: 10.17323/2500–2597.2017.3.94.102
20. Trachuk A.V., Linder N.V. The impact of technologies of the industry 4.0 on increase of productivity and transformation of innovative behavior of the industrial companies. *Strategicheskie resheniya i risk-menedzhment = Strategicheskie resheniya i risk-menedzhment.* 2020;11(2):132–149. DOI: 10.17747/2618–947X- 2020–2–132–149.

21. Trachuk A.V., Linder N.V. Innovations and their industrial classifications: Approach to building a new typology. *Strategicheskie resheniya i risk-menedzhment = Strategic Decision and Risk Management*. 2019;10(4):296–305. DOI: 10.17747/2618–947X-2019–4–296–305
22. Männasoo K., Meriküll J. Credit constraints and R&D over the boom and bust: Firm-level evidence from Central and Eastern Europe. *Economic Systems*. 2020;44(2):100747. DOI: 10.1016/j.ecosys.2020.100747
23. Lööf H., Nabavi P. Innovation and credit constraints: Evidence from Swedish exporting firms. *Economics of Innovation and New Technology*. 2016;25(3):269–282. DOI: 10.1080/10438599.2015.1076196
24. Beneito P., Rochina-Barrachina M.E., Sanchís A. Foreign capital, credit constraints and continuity of firms' R&D. *Applied Economics Letters*. 2016;23(3):157–161. DOI: 10.1080/13504851.2015.1061635
25. Kang T., Baek C., Lee J.-D. The persistency and volatility of the firm R&D investment: Revisited from the perspective of technological capability. *Research Policy*. 2017;46(9):1570–1579. DOI: 10.1016/j.respol.2017.07.006
26. Cruz-Castro L., Holl A., Rama R., Sanz-Menéndez L. Economic crisis and company R&D in Spain: Do regional and policy factors matter? *Industry and Innovation*. 2018;25(8):729–751. DOI: 10.1080/13662716.2017.1355231
27. Armand A., Mendi P. Demand drops and innovation investments: Evidence from the Great Recession in Spain. *Research Policy*. 2018;47(7):1321–1333. DOI: 10.1016/j.respol.2018.04.015
28. Archer L., Sharma P., Su J.-J. Do credit constraints always impede innovation? Empirical evidence from Vietnamese SMEs. *Applied Economics*. 2020;52(44):4864–4880. DOI: 10.1080/00036846.2020.1751049
29. Spescha A., Woerter M. Innovation and firm growth over the business cycle. *Industry and Innovation*.2019;26(3):321–347. DOI: 10.1080/13662716.2018.1431523
30. Giebel M., Kraft K. The impact of the financial crisis on capital investments in innovative firms. *Industrial and Corporate Change*. 2019;28(5):1079–1099. DOI: 10.1093/icc/dty050
31. Añón-Higón D., Manjón-Antolín M., Máñez J.A., Sanchis-Llopis J.A. Does R&D protect SMEs from the hardness of the cycle? Evidence from Spanish SMEs (1990–2009). *International Entrepreneurship and Management Journal*. 2015;11(2):361–376. DOI: 10.1007/s11365–014–0329–0
32. Silvestri D., Riccaboni M., Malva A.D. Sailing in all winds: Technological search over the business cycle. *Research Policy*. 2018;47(10):1933–1944. DOI: 10.1016/j.respol.2018.07.002
33. Trachuk A.V., Linder N.V. Liquidity limitation influence on industrial companies' investments in investigations and development, and effectiveness of innovative activity. *Effektivnoe antikrizisnoe upravlenie = Effective Crisis Management*. 2016;(1):80–89. (In Russ.). DOI: 10.17747/2078–8886–2016–1–80–89
34. Skrondal A., Laake P. Regression among factor scores. *Psychometrika*. 2001;66(4):563–575. DOI: 10.1007/BF02296196
35. Salas-Fumás V., Javier Ortiz J. Innovations' success and failure in the business cycle. *Sustainability*. 2019;11(15):4187. DOI: 10.3390/su11154187
36. Belyaeva T.V., Shirokova G.V., Gafforova E.B. Firm performance during the economic crisis: The role of strategic orientations and financial capital. *Rossiiskii zhurnal menedzhmenta = Russian Management Journal*. 2017;15(2):131–162. (In Russ.). DOI: 10.21638/11701/spbu18.2017.201

ABOUT THE AUTHORS

Arkadii V. Trachuk — Dr. Sci. (Econ.), Prof., Dean, Higher School of Management, Financial University, Moscow, Russia; General Director, Joint Stock Company "Goznak", Moscow, Russia
Trachuk_A_V@goznak.ru

Nataliya V. Linder — Cand. Sci. (Econ.), Prof., Head of Department of Management and Innovations, Deputy Dean, Higher School of Management, Financial University, Moscow, Russia
NVLinder@fa.ru

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Power, Market and Social System Complexity: Theoretical Model of Financial and Management Mechanism

E.V. Balatsky[a], **N.A. Ekimova**[b]
[a, b] Financial University, Moscow, Russia;
[a] Central Economics and Mathematics Institute Russian Academy of Sciences, Moscow, Russia
[a] https://orcid.org/0000-0002-3371-2229; [b] https://orcid.org/0000-0001-6873-7146

ABSTRACT

The article considers the influence of the complexity of the social system on the growth of financial costs for the maintenance of the central management system. **The subject** of the article is Professor Dmitry Sorokin's theory that Russia cannot be a world technological leader due to objective reasons: a large territory, a severe climate, a multinational and multi-confessional composition of the population. These conditions predetermine a strong power vertical and increased financial costs, leading to the bureaucratic despotism and worse effectiveness of market innovation mechanisms. **The relevance** of the problem is in the need to clarify the management capabilities and limitations of regimes with strong centralized power. This issue is becoming more urgent due to the fact Wagner's law, which requires faster growth of public expenditure compared to the economy, has ceased to operate. The article **aims** to theoretically illustrate and to test the theory by D. Sorokin. On this purpose, the authors built a simple theoretical model of economic growth with an institutional factor reflecting the properties of the control system. **The novelty** of the approach consists in building an institutional function that includes management costs for maintaining the internal integrity of the country and its external security, the management potential ("strength") of the central government and the mechanism of market self-government. The initial driving force of the model is the growing complexity of the managed system, which, by D. Zolo's complexity theory, leads to the wide spread of authoritarian political regimes. **The analysis** of the model and computational experiments allowed to establish the conditions when Sorokin's theory is valid and when not. The calculations have led to **the conclusion** that even a tough authoritarian rule can stimulate the country's economic development, provided that the current system of central government is highly efficient and low in financial capacity.

Keywords: government expenditure; Wagner's law; Ashby's Law of Requisite Variety; Sedov's Law of Hierarchical Compensation; complexity

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INTRODUCTION

It is hardly an exaggeration to say that the leadership of the Russian Federation over the past 20 years has been actively trying to solve the problem of the country's technological modernization. Much has been done for this divergently: numerous regulatory documents have been adopted, significant amounts of money have been allocated for certain areas, specialized innovation centers have been created, etc. However, the results of all these efforts are quite poor. This raises a question of general scientific significance: what is the reason for Russia's permanent failures? Can our country be a world technological leader at all?

Answers to these questions are complicated by the fact that at certain periods of time Russia achieved absolutely incredible scientific and technological successes, but most of the time it was a technologically lagging country.

The starting point is the report by Dmitrii Sorokin presented at the VI International Congress "Production, Science and Education" (PNO-2019).[1] According to D. Sorokin, Russia's permanent failures in the technological modernization have their own political and economic logic. In a few words it is as follows: the vast territory of the country and its difficult climate require a strong central government to preserve its internal unity and ensure external security; otherwise, the country will either disintegrate itself, or undergo a military invasion from outside; in turn, strong power leads to the despotism of officials, who create endless obstacles to entrepreneurs and innovators. This institutional climate makes the domestic market for technological innovation relatively small and extremely sluggish. Abandoning authoritarian power to develop liberal-democratic foundations in Russian society usually contributes to increasing chaos with the most negative consequences. For example, the liberal regime of Nicholai II provoked the October Revolution of 1917, the collapse of the Russian Empire and its transformation into the USSR. The democratic reforms of M. Gorbachev led to the collapse of the USSR in 1991, which had grown over the years of its existence, into 15 separate countries. B. Yeltsin's policy of granting unlimited freedom to the regions of the Russian Federation disintegrated the country again, which required the transition to V. Putin's authoritarian methods in 2000 [1]. According to D. Sorokin, there is no alternative to a strong central government for Russia. Consequently, it will never become a world technology leader. The efforts must be focused on finding a bureaucratic management system that would prevent the state from critically lagging behind the leading countries.

This concept is quite interesting and meaningful. Although some parts of it are well known and discussed in the media, D. Sorokin integrated them, gave it a political and economic form and dogmatized *the impossibility of Russia's technological leadership*. Hereinafter, with a certain convention, we will call these provisions D. Sorokin's concept. These political economic considerations are expressed verbally and are not supported by formal and empirical tools. Therefore, the study aims to build a model of public administration that would allow to strictly mathematically illustrate the concept of D. Sorokin and to test its validity about the impossibility of Russia's technological leadership.

The relevance of the work is determined by the fact that the theory of D. Sorokin basically puts an end to the large-scale technological modernization of the Russian economy and proposes just a slight improvement in the existing bureaucratic model of country management and its adaptation to the current situation. However, this unassuming scenario

[1] The political economy of technological leadership. Report at VI International Congress "Production, Science and Education" (PNO-2019). TV–Info, December 5. URL: https://www.youtube.com/watch?v=gpZvP60W6rY (accessed on 05.11.2020).

for Russia's development seems extremely undesirable. The proposed model aims at determining the features of the governing system that allow the country to overcome the "centralization syndrome" and to claim global technological leadership.

PRINCIPLES OF THE MODERN CONTROL THEORY

A cornerstone achievement of the control theory (cybernetics) is Ashby's *law of requisite variety* and Sedov's *law of hierarchical compensation* formulated in the 1950s. According to the first, the complexity (variety) of the control subsystem should be no less than the complexity (variety) of the controlled subsystem. According to W. Ashby's law, the development of the economy should be accompanied by an outrunning complexity of the management system, which entails an accelerated increase in the load on the public administration system. If the public administration system is not able to adequately improve (increase its variety), then according to E. Sedov's law, it must reduce the variety of the controlled system — the economy [2]. These views were anticipated by Aleksandr Bogdanov (Malinovskii) back in 1913–1929 in his tektology, where the Ashby's law function is realized by ingression mechanisms (unification of the activities of system elements) and egression (centralization and coordination of the activities of system elements), the E. Sedov's law function is realized by disingression (separation of the activities of system elements) [3].

Being the result of an abstract generalization of long-term observations of various systems, the laws by W. Ashby and E. Sedov make it possible to interpret the dynamics and development of any complex formations. Thus, the role of E. Sedov's law is shown on the example of the standardization of markets and institutions, when the excessive complexity of the economy leads to a simplifying management effect on the part of the regulator [4, 5]. Market regulation creates certain frameworks (constraints) and thereby eliminates the increased complexity of the economy.

One of the Ashby's law manifestations was the global increase in the share of government expenditure in all countries (with no exception) over the past 150 years. German economist Adolph Wagner was the first to notice this pattern. In 1892, he formulated *the law of increasing state activities*: in countries with developed industry, the increase in government expenditure is faster than the output and national income. This is due to the complexity of socio-economic relations and the strengthening of the regulatory function of the state against this background. Over 150 years, this law has been empirically confirmed for different countries (*Table 1*), and therefore it has long been considered one of the most inviolable economic laws [6].

Wagner's law is no longer valid in many countries. This is due to the fact that the share of government expenditure in GDP in some states exceeded 50% by the end of the last century, which, most likely, became the marginal financial burden, requiring the search for other approaches to complicating the management system. One of the simplest consequences of the fact that Wagner's law is exhausted was the decline in development of advanced (democratic) countries and globally growing authoritarian regimes of various severity as the most economically and socially effective, based on Sedov's law [8]. The most prominent examples are China, Turkey and Iran. Less pronounced success is in Belarus, Vietnam and North Korea. Russia steadily follows this global trend, but with much less economic dynamism. The events of 2020 associated with the COVID-19 pandemic clearly showed the lack of central government power in the United States, which did not timely prevent election riots and law violations. In some European countries, on the contrary, signs of authoritarianism appeared in the form of an overly strict regime of self-isolation of the population.

Table 1

Share of government expenditure in GDP in developed countries

Countries	Share of government expenditure in GDP, %			
	1870	1960	1996	2019
Austria	10.0	35.7	52.0	48.2
France	13.0	34.6	55.0	55.6
Germany	10.0	32.4	49.0	45.7
Italy	14.0	30.1	53.0	48.7
Japan	9.0	17.5	36.0	38.9
Norway	6.0	29.9	49.0	51.8
Sweden	6.0	31.0	64.0	49.3
Switzerland	16.0	17.2	39.0	32.7
Great Britain	9.0	32.2	43.0	39.3
USA	7.0	27.0	32.0	37.8

Source: Bainev V., Komar I. [7]; Trading Economics. URL: https://ru.tradingeconomics.com/country-list/government-spending-to-gdp (accessed on 05.11.2020).

Italian political scientist Danilo Zolo explains that the main threat to democratic traditions is the increasing complexity of modern society [9]. The excessive complexity of society due to democratic freedoms (freedom of the media, the activities of public organizations, the political activity of the population at rallies and demonstrations, force majeure such as the COVID-19 pandemic, etc.) leads to increasing social risks and generates a response from the authorities. Rigid regulation of social life in the form of prohibitions leads to blocking its centrifugal tendencies, which is equivalent to its simplification. This anti-democratic method of government is a natural manifestation of Sedov's law, when the governing system does not try to develop to the governed one and to surpass it, but simplifies the latter to its own level, thereby causing stagnation in the development of society. Democratic regimes are more progressive and tolerant of all kinds of freedoms, but their maintenance becomes too expensive.

As a rule, the development of any society is an alternating action of Sedov's and Ashby's laws, which manifests itself in the cyclical nature of authoritarian (Sedov's law) and democratic (Ashby's law) regimes. This alternation of different methods of government is typical even for Russia, where over the course of many centuries the institutions of authoritarian power were replaced by their democratic antipodes (city veche, Boyar Duma, noble meetings, State Duma, etc.) [4].

Ashby's and Sedov's laws are supplemented by Arnold Toynbee's concept stating that the development of civilization is affected by external disturbances of the "challenge-response" model. This means that the complexity of social systems as a global trend of evolutionary development constantly challenges the system of public administration. If the latter accepts the challenge and adequately responds to it, it continues to exist and develop. Otherwise, society degrades to the point of complete

destruction along with an incapacitated system of power [10].

The foregoing unambiguously indicates that if earlier the increasing complexity of society "spilled over" into the growth of government spending, today we must search for new management mechanisms and new forms of interaction between the system of power and economic entities. There are opportunities for this, especially in the context of total digitalization.

One of the traditional and universal tools for increasing the efficiency of the public administration system is the dosed decentralization of power, including administrative, aimed at redistributing powers, responsibility and financial resources between different levels of the management system [11, 12]. The analysis of the relationship between administrative decentralization and economic growth in China on the example of implementing the *China's counties power expansion reform* in 2002, showed that transferring powers to the lower (county) level of government contributed to GDP growth per capita by 3.3%, which was mainly due to the expansion of the local administration's ability to attract investment (an increase of 18.8% from 2000 to 2008). The positive effect weakened in the regions under less government supervision [13]. In the context of interaction between the control and controlled subsystems, this experience demonstrates at least two important points. On the one hand, at the level of interaction between local authorities and their subordinate territories, there is a clear complexity of the control system due to the delegation of new functions and additional resources. On the other hand, the management system at the level of the central government has become more complicated due to creating an extensive network of subordinate bodies, which made it possible not only to redistribute resources, but also to increase the efficiency of the central government management. The analysis showed that the weakening of the supervisory function "simplified" the control subsystem of the center and made it less complex relative to the control subsystem of counties, which significantly reduced the efficiency of public administration in the regions [13].

Decentralization of power has proven its efficiency not only at the state level, but also in the management of large organizations, when the management system becomes more complex due to a complex of lower management subsystems. Thus, the introduction of a three-level corporate project management system at *Gazprom Dobycha Yamburg*, which looped all stages of the project development from its inception to full implementation, made it possible to reduce the complexity of the overall enterprise management, free up the management resource of top management and thereby increase the manageability of the entire organization [14]. The complexity of the corporate management apparatus implies the introduction of advanced management technologies, and not just the attraction of additional human resources and the expansion of the administrative staff [15].

The main reserve for the management system efficiency is improving personnel management aimed at increasing the professionalism and competence of personnel. A lot of work is being done in this direction in the public sector. In particular, on the development of competence models, which in many countries are a key tool in human resource management systems [16]; creating a personnel reserve has become widespread in Russia [17]; aimed at recruiting professional staff in government bodies, Indonesian multilevel model of human capital management NUSANTARA has a good history [18].

Modern development is a multifaceted cyclical process with a permanent complexity of the controlled subsystem, challenging the control subsystem, whose response should increase its complexity. If this does not happen, either the entire system starts

degrading, which may lead to its complete collapse, or it will move to authoritarian regimes of power with their inherent ineffective "manual control" of the economy, indicating a managerial crisis of the central government.

INTERACTION MODEL OF POWER, MARKET AND COMPLEXITY OF THE SOCIAL SYSTEM

We will illustrate the above logic of the evolution and functioning of socio-economic systems on the corresponding model of economic growth.

This model serves mainly as an illustration of the described mechanism, but it indirectly proves the thesis about the dependence of the Russian economy on its spatial and climatic features. This dependence is by no means unambiguous and not fatal that may justify all subsequent constructions.

The model is based on a standard macroeconomic production function where for simplicity we will use a linear relationship:

$$Y(t) = A + \alpha K(t) + \beta L(t) + U(t), \qquad (1)$$

where Y is the level of production in the country (GDP); K is the amount of fixed capital in the national economy (production technologies); L is the number of employees in the national economy (human capital); U is the macroeconomic organizational potential of the state (variety of institutions and regulatory instruments); A, α and β are the parameters of function (1), determined statistically by constructing the corresponding econometric dependence; all parameters are positive by default.

In the literature, an established standard usually considers three participants at the macro level: the state (management by maintaining certain institutions and their efficiency), the employer (investments in fixed assets through the purchase of new technologies) and employees (the number of employees able to work with modern technology). Here, function (1) can be considered an absolutely traditional analytical construction.

By function (1), we describe the economic growth of a certain conditional country, since the described mechanism is universal and typical of all countries.

Function (1) can be written in a dynamic form (by time differentiation):

$$dY/dt = \alpha(dK/dt) + \beta(dL/dt) + dU/dt, \qquad (2)$$

where t is time, and the derivatives show the increments of the corresponding quantities. For simplicity we will assume that $dt = 1$ and will operate simply with absolute increments.

The next step in modeling the public administration is the most important and interesting aspect of the study. We assume that the very managerial potential of state U depends on several groups of factors: *the effect of assembling* all the country's resources for purposeful use, provided by the central authorities; *the effect of market self-regulation* of the system of economic resources; *the effect of diverting* part of the managerial potential to non-economic tasks — maintaining the country's internal integrity and ensuring its external security. It is legitimate to introduce the following institutional function (for simplicity we will also write it in linear form):

$$U(t) = B - aV(t) - bW(t) + mM(t) + (h-n)C(t), \qquad (3)$$

where V is management costs for maintaining the internal integrity of the country; W is management costs for maintaining the country's external security; C is the managerial potential of the central government (the "strength" of the vertical of power); M is the potential of market self-government (market "strength"); B, a, b, h, m and n are the parameters of function (3); like in function (1), all the parameters are positive.

Function (3) requires some commenting. The macroeconomic potential of management depends on the diverting effect due to the

maintenance costs of the country's internal integrity and external security. This effect is described in function (3) by component ($-aV-bW$). In this case, it is assumed that the larger the territory of the country and the more severe its climate are, the higher these two types of costs are, "subtracted" from the general management potential. This fact determines the minus sign in front of corresponding parameters a and b. However, the values of these two parameters show the managerial efficiency of the state in solving the problems of internal integrity and external security. This means that even with a large country and cold climate, skillful management can reduce the diverting effect.

The main component of function (3) is the assembling effect (hC), which depends both on the strength of the vertical of power (C)[2] and on the art of using it to solve national economic problems (h). The assembling effect is complemented by the effect of market self-regulation ($mM-nC$). It depends on the power (capacity) of the market (M) and its ability to self-regulation (m), as well as on government intervention in this process ($-nC$). We assume that this intervention depends on the strength of the vertical of power (C) and is generally destructive in nature, which determines the negative sign of parameter n, as well as on the activity of the intervention itself (n). Thus, the efficiency of market self-regulation negatively depends on the strength and activity of the central government. Theoretically, one could assume that the intervention of the central government eliminates the so-called market failures and thereby improves its functioning. We will not consider this option, assuming that any outside interference disrupts natural market mechanisms and reduces their ability to self-regulation.

By analogy with function (1), function (3) can be represented in a dynamic form:

$$dU = -adV - bdW + mdM + (h-n)dC, \quad (4)$$

where, as already mentioned, the differentials denote the increments of the corresponding variables for the year.

The equation for the dynamics of economic growth will take its final form:

$$dY = \alpha dK + \beta dL - adV - bdW + mdM + (h-n)dC. \quad (5)$$

Equations (4) and (5) show that institutional dynamics will stimulate economic growth only if $dU > 0$. Equation (4) implies that fulfilling the inequality is a necessary condition for this development:

$$mdM + (h-n)dC > adV + bdW. \quad (6)$$

Violating condition (6) means the following: the managerial potential of the central government and market self-regulation are insufficient for effective management of the economy, because their resource is completely depleted by an extensive increase in maintenance costs of internal order and external sovereignty and a not very productive management system for these two geopolitical directions. The positive effect of increasing power takes place only if $h > n$. This means that the efficiency of general central regulation is quite high, and direct government intervention in the economy is not too great. Otherwise, the strengthening of power will only worsen the situation and hold back economic growth.

Generally, we have got a result showing the power possesses *the feature of managerial ambivalence*, already considered in the literature [20]: with sufficient flexibility and efficiency, a strong central government is capable of accelerating economic growth;

[2] The strength of the vertical of power can be measured in different ways. In particular, in work [19], Centralization index V was calculated by subtracting the values of this index for the USA (7.96) and Russia (3.11) from the maximum value of the Democracy Index D (10 points); as a result, for the USA V = 10 — D = 2.04, and for Russia — V = 10 — D = 6.89. Economist Intelligence Unit: The Democracy Index 2019. URL: https://www.eiu.com/public/topical_report.aspx?campaignid=democracyindex2019; https://gtmarket.ru/ratings/democracy-index/info) (accessed on 11/05/2020). In this case, a simple principle was used: the stronger and tougher the central government is, the less democratic foundations and freedoms in the country are.

otherwise, it has a restraining effect on the development of the economy.

Let us suppose that the model describes an "ordinary" country, i.e. with an average size of the territory, a temperate climate and a relatively democratic form of political government. For a state like Russia, which is many times larger than an "ordinary" country and has worse climatic conditions, as well as an immeasurably stronger central government, the following ratios can be written:

$$V^* = kV\,, \tag{7}$$

$$W^* = kW\,, \tag{8}$$

$$C^* = kC\,, \tag{9}$$

$$M^* = M/k\,, \tag{10}$$

where the asterisk marks the indicators of the Russian economy.

The coefficient of the relative strength of the central government of Russia in relation to the "ordinary" country $k > 1$ in dependencies (7)–(10) is determined by the above reasons, which determine the costs of internal and external security. This, in turn, requires a stronger vertical of power, while the market potential, on the contrary, is cut down by this power. Expression (10) is fundamental. In contrast to formulas (7)–(9), it sets an inverse dependence of the structural variable with the relative strength of the central government. This ratio fixes the confrontation between power and the market: the more power is, the weaker the market mechanisms are and the larger the segment of the market that is under the direct patronage of the government.

Generally, the proportionality coefficients in (7)–(10) are different. However, for simplicity of calculations, we will assume that they have the same value — k. If we assume that the dynamics of capital and labor in Russia coincides with their dynamics in an "ordinary" country, then equation (5) can be rewritten for Russia as follows:

$$dY = \alpha dK + \beta dL - adV^* - bdW^* + mdM^*(h-n)dC^*. \tag{11}$$

Considering equations (7)–(10), the assumption of the invariability of coefficient k in time and the equality of the parameters in the functions of both countries, equation (11) will be as follows:

$$dY = \alpha dK + \beta dL - k(adV + bdW) + \frac{mdM}{k} + (h-n)kdC. \tag{12}$$

Then the impact of the managerial factor will stimulate economic growth both with an analogue of condition (6) and considering ratios (7)–(10):

$$\frac{mdM}{k} > k\left[adV + bdW - (h-n)dC\right]. \tag{13}$$

Condition (13) sets the upper limit (k^*) of the relative strength of the vertical of power in Russia:

$$k < k^*, \tag{14}$$

where the critical value k^* is determined by formula:

$$k^* = \sqrt{\frac{mdM}{(n-h)dC + adV + bdW}}\,. \tag{15}$$

If $n > h$, the upper limit k^* certainly exists; if h slightly exceeds n, this limit also takes place. Thus, with excessive pressure from the vertical of central government on the market, the state management system cannot cope with its responsibilities and has a negative impact on economic growth.

For all their simplicity, the formulas demonstrate the nontriviality of the role of the central government and a large territory of the country. For example, if

$$(h-n)dC > adV + bdW \tag{16}$$

then any strengthening of power (k growth) will positively affect the economic development

of the country; otherwise, the power of the central government should be limited to some reasonable level (15).

We will now get back to the idea of complexity. Growing complexity of the socio-economic system determines the growing costs for its internal and external protection, the growth of the market "volume" and, ultimately, the maximum strengthening of the central government. Thus, the main initial and completely impersonal factor of the dynamics of the control system (power of authority) is the complexity of the controlled system (economy).

Therefore, we will get back to Danilo Zolo's concept, which sees the complexity of the system as equivalent to the increasing freedom of its elements and leads to the need for government response in the form of increasing all restrictions. To ensure these restrictions, it is necessary to maximally concentrate and strengthen the power itself. Due to increasing complexity is in the modern world, the logic of D. Zolo leads him to the conclusion about the coming domination of authoritarian regimes.

Developing D. Zolo's idea, we will consider the auxiliary linear dependences of the structure variables of the control function on the complexity of the controlled system:

$$V(t)=V(0)+a^*S(t), \quad (17)$$

$$W(t)=W(0)+b^*S(t), \quad (18)$$

$$C(t)=C(0)+h^*S(t), \quad (19)$$

$$M(t)=M(0)+m^*S(t), \quad (20)$$

where S is the complexity of the socio-economic system of an ordinary country; the asterisk marks new parameters in the presented dependencies. As before, all parameters are positive. We leave aside the question of how to measure the complexity of a social system in practice. This is due to two circumstances. First, as will be shown below, this aggregate will not be included in the final conclusions on the model. Second, there is no doubt the very possibility of assessing the complexity of a social system, but assessment methods can be arbitrarily diverse and non-trivial; this is a discussion for a separate study.

The condition for the efficiency of the control system will then take on a more compact form (due to the fact that, in accordance with dependencies (17) –(20), all changes in structural variables depend on the increase in complexity dS, reduced in subsequent calculations):

$$\frac{mm^*}{k} > k\left[aa^*+bb^*-h^*(h-n)\right]. \quad (21)$$

Condition (16) is specified by the following equation:

$$(h-n)h^* > aa^*+bb^*. \quad (22)$$

If equation (22) is satisfied then the built power vertical is highly effective and its strengthening will only streamline the socio-economic system and has a beneficial effect on all aspects of public life. If condition (22) is not satisfied and the central government is not very effective, then its upper limit is calculated quite simply:

$$k^* = \sqrt{\frac{mm^*}{aa^*+bb^*+h^*(n-h)}}. \quad (23)$$

Thus, the need for power is completely determined by the configuration of parameters (23), where the parameters reflect the efficiency of the public administration system's response to external disturbances.

Let us summarize the models.

First, we considered a three-level system of economic growth formation. The first level is associated with a challenge that comes in the form of an increase in the complexity of the social system. Four subsystems of public administration respond to this challenge with various adequacy and efficiency: management costs for maintaining the

Table 2

Initial and calculated parameters of the model

Model parameters	Calculation scenarios					
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
a	0.80	0.60	0.60	0.60	0.50	0.45
*a**	0.90	0.90	0.90	0.90	0.90	0.90
b	0.80	0.60	0.60	0.60	0.50	0.50
*b**	0.90	0.90	0.90	0.90	0.90	0.90
m	0.90	0.90	0.90	0.90	0.90	0.90
*m**	1.20	1.20	1.20	1.20	1.20	1.20
h	0.50	0.80	0.80	0.80	0.80	0.80
*h**	1.20	1.30	1.30	1.30	1.30	1.30
n	0.00	0.00	0.05	0.15	0.15	0.15
*k**	1.13	5.20	3.21	2.14	4.43	10.39

Source: the authors' calculations.

country's internal integrity; management costs for maintaining the country's external security; the administrative potential of the central government ("strength" of the vertical of power); the potential of market self-government (market "strength"). At this level, we consider the efficiency of the subsystems of public administration. At the second level, these four subsystems are assembled into a common power potential to maintain the efficiency of the entire public administration system. At this level, we consider the efficiency of the public administration system in coordinating all subsystems and maintaining the capacity to perform other functions. The third level examines the direct impact of the government's ability to maintain the efficiency of various institutions on the economic growth rate.

We consider the Russian geographic and geopolitical specifics through the decomposition of its influence on the economic development through different management channels. This approach makes it possible to identify the least effective management areas that lead to system failure, when ineffective government tries to compensate for its shortcomings by direct pressure on the situation, when it is necessary to build up the very potential of the power vertical.

Critical assessment (23) of the relative power of the central government has a simple interpretation: growing power of the center allows to positively affect economic growth only until limit k^* is reached. Excessing the limit grows out of proportion and "cuts" the economic growth rate. Moreover, the higher the efficiency of the public administration system, the larger limit k^* is. This is a very important thing, which we will dwell on in more detail below: only effective totalitarianism has the right to exist; the ineffective one just destroys everything.

All aggregates discussed above can obviously be expressed in monetary form, when the interpretation of all processes becomes as transparent as possible. In theory, we could use other units of measurement.

RESULTS OF EXPERIMENTAL CALCULATIONS

To understand the action mechanism of the model and the scale of all digital values, we will consider six scenarios that differ in the initial parameters specified in Model 9. *Table 2* demonstrates the calculation results using formula (23) and the initial data.

When designing the scenarios, we used two principles. The first involves considering a sufficiently efficient control system: the overwhelming number of parameters is less than 1, i.e. management costs grow more slowly than the complexity of the corresponding managed subsystem occurs. The second principle assumes that $h^* \geq m^*$, i.e. Ashby's law is observed: the complexity of the control system (h^*) must be no less than the complexity of the controlled system (m^*). In all scenarios, the complexity of the market is not faster than the growth of power and the complexity of the state administration system.

We will consider the scenarios in *Table 2* in more detail.

When comparing scenarios 1 and 2, it can be seen that even entire elimination of the state from influencing the market ($n = 0$) cannot justify a high level of the vertical of power. Non-interference in the market functioning gives an effect only if the state effectively copes with external and internal threats by complicating the management system.

Comparing scenarios No. 2, No. 3 and No. 4 shows that even the smallest interference in market processes sharply reduces tolerance for an authoritarian regime. As a rule, the dictatorship of the center and its legitimacy is based on an original model of mutually beneficial interaction between the state and the market. If, against the background of insignificant government intervention in the economy, there is a very modest increase in efficiency in response to challenges in the external and internal environment (scenario No. 5), then this power becomes acceptable again. If we add a very small increase in efficiency in the sphere of internal order in country (scenario No. 6), this justifies even a very high level of totalitarianism of the central government.

Paradoxical as it may seem, the calculations show that the despotism of the management system or the excessive strength of the vertical of power is not a serious constraint for the country's economic development as might be expected. The conclusion is even more unexpected that legitimate totalitarianism, manifested in a tolerant attitude of the population, must still be earned. In other words, the full power of the state's leader or the ruling elite can only be justified by its managerial efficiency. Otherwise, excessive centralization of power causes rejection by the masses and economic stagnation.

In such way the result explains the dreams of many peoples (including Russians) about a strong ruler. However, this strong ruler must, above all, be effective. Otherwise, the voluntarism of the authorities finds no justification, and the entire socio-economic system degrades.

DISCUSSION OF THE RESULTS

The built model made it possible to generalize and correct Professor Dmitry Sorokin's thesis about the absence of political and economic prerequisites for Russia's technological leadership. At first sight this thesis seems to be correct, but it is violated if we build a highly efficient public administration system. Organizational, technological and personnel reserves are used to increase the efficiency of the management system. This means that neither the gigantic area of Russia, nor its specific climate, nor the multinational and multi-confessional composition of the population, strictly speaking, are an insurmountable obstacle to the country's transformation into a global technological leader. In practice, however, overcoming this growing complexity is a big challenge.

The historical record confirms this result. For example, the administrative despotism

of Turkish leader Recep Tayyip Erdoğan is not in great doubt, but the strength of his central government does not interfere with the country's rapid economic growth for many years. This suggests that his government considers the interests of both national business and the common population. At the same time, R. Erdogan's rigid vertical of power is quite successfully combined with the country's market economy. Thus, the administrative apparatus of the ruler with unlimited power does not automatically lead to technological stagnation; on the contrary, Turkey today possesses advanced weapons, a robust economy and aspires to become a nuclear power.

A more striking example is provided by China, which has a large territory, a huge and heterogeneous population and extremely specific natural conditions, and, like in Russia, denies democratic forms of government. Xi Jinping's lifelong supreme power is enshrined at the legislative level and no one doubts his almost unlimited powers, but this did not prevent the PRC from going through a technological rally in 35 years, which allowed it today to claim world leadership. Besides a powerful public sector, the Chinese economy also has a solid market component.

The history of the USSR provides no less convincing examples. During 40 years, under the absolute centralism of power in the form of the dictatorship of the proletariat, from an agrarian country it turned into a space superpower with unconditional priority in many scientific and technological fields. Various elements of the market and competition also existed in the USSR: for example, work organization of several design bureaus in the field of aircraft construction. There are multiple examples, and all of them contradict D. Sorokin's thesis about the impossibility of Russia's technological leadership. Summing up, this thesis basically assumes that highly centralized power does not allow building an effective management system for a huge economy. Apparently, it is true in most cases, but regular exceptions to this rule provide grounds for expanding the theoretical framework of the political economy of technological leadership, as well as for searching for original management models that will allow Russia to rejoin the states demonstrating an exception to the rule.

The model and its analysis confirm the thesis about the innovative ambivalence of power. Everything depends on the focus of the ruling elite: it will either improve the system of public administration, according to W. Ashby's law, or, according to E. Sedov's law, it will try to simplify the controlled system by introducing various restrictions.

CONCLUSIONS

To finish the conversation about Russian specifics, we will note that the complexity of the controlled system depends on the size of the country, its climate, population, etc. However, all these dependencies are usually nonlinear and ambiguous. Therefore, it is wrong to think that Russia is a completely unique country with insoluble governance problems. In this context, it would be appropriate to mention the example of Singapore, which literally performed a miracle, stepping over 40 years from the third world to the first one.

In a sense, for all its dissimilarity to Russia, Singapore sets the only possible model for us. We will consider this issue in a bit more detail. Today, it is out of the question that modern Singapore is the merit of its leader, Lee Kuan Yew, who served as the all-powerful Prime Minister of the country from 1959 to 1990, i.e. about 32 years. This long-term irremovability of power and strict observance of very strict laws have become the hallmark of Singapore. What is the secret of the Singapore miracle?

Lee Kuan Yew answered this question: "America and Great Britain will continue to prosper even with a mediocre government, but we will not" [21, p. 275]. "Singapore is a tiny country without any natural resources, and in the middle of a historically unstable region. To

survive, we need an *ingenious* government" [21, p. 276]. "I am absolutely sure that if Singapore gets a dumb government, we are done for. The country will sink into nothingness" [21, p. 277]. This is why Singapore's government is carefully selected, nurtured, and adequately paid. While in the USA, Great Britain and other developed countries the most talented people and the best graduates of universities work in private companies, in Singapore they find themselves in the public service. Today, no country in the world pays its ministers as generously as Singapore. This fact has led to the creation of a unique ecosystem in the country that minimizes corruption and attracts the best talent from around the world. People are appointed to the posts of ministers who have already demonstrated outstanding success in the corporate sector and have experience in managing complex social systems.

This can be perfectly applied to Russia. The complexity of the country as a managed system is really great, and therefore requires, as in Singapore, an ingenious government, i.e. no less complex and finely arranged control system. The country's transition to the strategy of "super-competent power", generating correct management decisions, will make it possible to "overcome" D. Sorokin's logic of political economy of technological leadership and become another exception. Otherwise, any progressive technological innovation will have to be centrally and, as a rule, unsuccessfully "pressed" into the national economy by the administration.

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REFERENCES

1. Silaev D.P., Ganzhur M.A. The phenomenon of self-organization and the law of the need for diversity by U.R. Ashby. *Problemy sovremennogo pedagogicheskogo obrazovaniya = Problems of Modern Pedagogical Education*. 2018;(59–4):259–263. (In Russ.).
2. Balatsky E. Concept of complexity and economic theory of democracy. *Obshchestvo i ekonomika = Society and Economy*. 2013;(5):5–24. (In Russ.).
3. Bogdanov A.A. Tectology: General organizational science. Moscow: Lenand; 2019. 680 p. (In Russ.).
4. Tzirel S.V. "Qwerty effects", "path dependence" and the Sedov law, or is the creation of stable institutions in Russia possible? *Ekonomicheskii vestnik Rostovskogo gosudarstvennogo universiteta = Economic Herald of Rostov State University*. 2005;(3):44–56. (In Russ.).
5. Tzirel S.V. "Qwerty effects", "path dependence" and the law of hierarchical compensation. *Voprosy Ekonomiki*. 2005;(8):19–26. (In Russ.). DOI: 10.32609/0042–8736–2005–8–19–26
6. Balatsky E. Wagner's law, Armey-Rahn curve and wealth's paradox. *Obshchestvo i ekonomika = Society and Economy*. 2010;(9):80–97. (In Russ.).
7. Bainev V., Komar I. Government spending and Wagner's law. *Finansy, uchet, audit*. 2009;(12):30–33. (In Russ.).
8. Žižek S. The year of dreaming dangerously. London, New York: Verso Books; 2012. 142 p. (Russ. ed.: Žižek S. God nevozmozhnogo. Iskusstvo mechtat' opasno. Moscow: Evropa; 2012. 272 p.).
9. Zolo D. Democracy and complexity: A realist approach. University Park, PA: Penn State University Press; 1992. 202 p. (Russ. ed.: Zolo D. Demokratiya i slozhnost': realisticheskiy podkhod. Moscow: HSE Publ.; 2010. 320 p.).
10. Toynbee A.J. Civilization on trial. New York, London: Oxford University Press; 1948. 255 p.; Toynbee A.J. The world and the West. New York, London: Oxford University Press; 1952. 99 p. (Russ. ed.: Toynbee A.J. Tsivilizatsiya pered sudom istorii. Mir i Zapad. Moscow: AST; Astrel; 2011. 318 p.).

11. Bardhan P., Mookherjee D., eds. Decentralization and local governance in developing countries: A comparative perspective. Cambridge, MA: The MIT Press; 2006. 363 p.
12. Grindle M.S. Going local: Decentralization, democratization, and the promise of good governance. Princeton, NJ: Princeton University Press; 2007. 256 p.
13. Gong Q., Liu Ch., Wu M. Does administrative decentralization enhance economic growth? Evidence from a quasi-natural experiment in China. *Economic Modelling*. 2021;94:945–952. DOI: 10.1016/j.econmod.2020.02.035
14. Andreev O., Arabsky A., Kramar V. On the problems of transition to modern management systems. *Standarty i kachestvo = Standards and Quality*. 2012;(8):56–59. (In Russ.).
15. Khomyakov V.N. Cybernetics, law of requisite variety, and development of economic indicator forecasts. *Izvestiya Tul'skogo gosudarstvennogo universiteta. Ekonomicheskie i yuridicheskie nauki = News of the Tula State University. Economic and Legal Sciences*. 2014;(1–1):128–141. (In Russ.).
16. Skorková Z. Competency models in public sector. *Procedia — Social and Behavioral Sciences*. 2016;230:226–234. DOI: 10.1016/j.sbspro.2016.09.029
17. Sheburakov I.B. Reserves of managerial personnel in the Russian Federation as a tool for the development of personnel in the field of public administration. *Vestnik Rossiiskogo universiteta druzhby narodov. Seriya: gosudarstvennoe i munitsipal'noe upravlenie = RUDN Journal of Public Administration*. 2019;6(2):148–157. (In Russ.). DOI: 10.22363/2312–8313–2019–6–2–148–157
18. Cahyaningsih E., Sensuse D.I., Arymurthy A.M., Wibowo W.C. NUSANTARA: A new model of knowledge management in government human capital management. Procedia Computer Science. 2017;124:61–68. DOI: 10.1016/j.procs.2017.12.130
19. Balatsky E.V., Yurevich M.A. Central government, market competition and technological progress: Model experiments and stylized examples. Journal of Economic Regulation. 2020;11(3):2137. (In Russ.). DOI: 10.17835/2078–5429.2020.11.3.021–037
20. Balatsky E.V., Ekimova N.A. Alternative model for managing innovation and high-tech sector of the Russian economy. *Upravlenets = The Manager*. 2020;11(5):2–16. (In Russ.). DOI: 10.29141/2218–5003–2020–11–5–1
21. Yew Lee Kuan. One man's view of the world. Singapore: Straits Times Press Pte Ltd.; 2013. 348 p. (Russ. ed.: Yew Lee Kuan. Moi vzglyad na budushchee mira. Moscow: Alpina Non-Fiction; 2017. 446 p.).

ABOUT THE AUTHORS

Evgeny V. Balatsky — Dr. Sci (Econ.), Prof., Director, Center for Macroeconomic Research, Financial University, Moscow, Russia; Chief Researcher, Central Economics and Mathematics Institute Russian Academy of Sciences, Moscow, Russia
evbalatsky@inbox.ru

Nataly A. Ekimova — Cand. Sci (Econ.), Assoc. Prof., Leading Researcher, Center for Macroeconomic Research, Financial University, Moscow, Russia
NAEkimova@fa.ru

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Corporate Social Responsibility: Strengthening Brand Value and Affecting Company's Financial Performance

N.Yu. Zhukova[a] ✉, **A.E. Melikova**[b]
[a, b] HSE University, Perm branch, Perm, Russia
[a] https://orcid.org/0000-0003-1126-3343; [b] https://orcid.org/0000-0003-0879-3589
✉ Corresponding author

ABSTRACT

The article **aims** to identify the influence of corporate social responsibility on the relationship between brand value and the company's financial performance. The **methodological basis** of the work is an empirical study of an open data sample on 78 American companies for 2000–2019. The authors analyzed 962 observations from the Thomson Reuters Eikon database. The Interbrand consulting agency was the source for determining the brand value. Built by the authors, three regression models rely on panel data and control an extended set of accounting and corporate variables. The evaluation of the models employs a fixed effects model. The authors **conclude** that corporate investments in social responsibility activities have a positive indirect effect on the company's financial performance, such as return on assets and market capitalization: the influence of brand value on these indicators increases due to a high level of corporate social responsibility and ethical behavior. The study showed that the level of corporate social responsibility neither enhances nor it weakens the influence of the brand on the return on equity. The study results may be of practical use to owners, top management of companies and investors when making the company's strategy and investment decisions. Moreover, the research materials can be used by public authorities to stimulate the corporate social responsibility. **The prospects** for future research may relate to lifting the current restrictions: research on samples that include more heterogeneous companies and/or companies from different countries.

Keywords: corporate social responsibility; brand; brand value; financial indicators; return on assets; return on equity; market capitalization

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INTRODUCTION

The relevance of such a phenomenon as "corporate social responsibility" (hereinafter referred to as "CSR"), was clearly manifested in the case of a pandemic due to the coronavirus, when it is required not only to support economic growth, but also to mobilize private sector resources for social needs, i.e. companies must fulfill a specific social function. The company leaders understanding the need to interact with a society made it possible back in 2001 to officially introduce the concept "corporate social responsibility", which was proposed to be considered as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis".[1] This study comprises a broader interpretation of CSR,

[1] Commission of the European Communities (2001), Green Paper: Promoting a European framework for Corporate Social Responsibility. URL: https://ec.europa.eu/transparency/regdoc/rep/1/2001/EN/1–2001–366-EN-1–0.Pdf (accessed on 21.08.2020).

which was proposed by A. McWilliams and D. Siegel as actions of a firm that go beyond its immediate interests, are not required by law, but contribute to the achievement of some public good [1].

At the end of 2019, CEOs of more than 180 of the largest American companies signed the Statement[2] on the Purpose of a Corporation, in which they noted that the Principles of Corporate Governance issued since 1978, according to which corporations exist to serve shareholders, no longer reflect the current situation. As such, the statement cited that the long-term success of companies and the U.S. economy depends on businesses investing in their workers and communities.

J. Stiglitz also notes [2] that currently, the pressing problem of corporate governance is the misalignment of incentives of individuals with those of the organization and, in a broader sense, with the interests of society in long-term economic growth.

In our opinion, the role of CSR in business will increase regardless of the industry and will be stimulated/encouraged by the state to perform a certain public function by the company in the future. For example, Russia has already adopted a law on amendments to the Tax Code, which provides certain benefits and support measures for NPOs focused on social responsibilities during the pandemic. In addition, this law introduces a tax deduction for businesses that participate in charitable activities: from January 1, 2020, commercial companies can classify charitable expenses as non-operating expenses in an amount not exceeding 1% of the organization's revenue.

Besides, companies' CSR initiatives are beneficial in terms of building a positive public image and fostering trust between the firm and the community. Failure to meet growing community expectations can jeopardize a company's image and reputation. Therefore, many companies are paying more and more attention to creating a socially responsible brand and communicating their values to society.

The purpose of our study is to identify the impact of a company's CSR not only on performance but also on the relationship between brand value and financial performance. The main distinguishing feature of the paper is that we consider a sample within a long period of time (20 years) and control an extended set of accounting and corporate variables.

The article has the following structure: 1) a theoretical review of research on the impact of brand and CSR on the company's financial performance; 2) statement of the problem and research hypotheses; 3) description of the study sample; 4) research methodology; 5) results; 6) limitations and future research; 7) conclusions.

THEORETICAL OVERVIEW

The impact of brand on financial performance

As noted by J. Barney, M. Wright, and D. Ketchen [3], the main theoretical basis for studying the relationship between the brand and the company's performance is the resource-based view, according to which resources that are valuable, rare, inimitable, and non-substitutable (VRIN criterion) contribute to creating a competitive advantage for companies. Based on the fact that a brand fully meets this criterion, it is considered as one of the most important strategic assets of a company, which allows firms to be competitive in the market, successfully and effectively create value for stakeholders in a way that their competitors cannot do [3], which, in turn, should have a positive effect on the performance of firms.

Previous research suggests that brand value can influence a company's performance by increasing revenue or decreasing costs. So, if we consider the effect of a brand on income, then brand equity, according to the research of K. Ailawadi, D. Lehmann, and S. Neslin [4], can affect both the price and quantity.

[2] Business Roundtable. Statement on the Purpose of a Corporation. URL: https://opportunity.businessroundtable.org/our-commitment/ (accessed on 19.08.2020).

For example, the influence of a strong brand on improving the financial performance of companies by increasing demand for their goods and services has been confirmed [5, 6]. In terms of costs, firms with a strong brand can also use aspects such as brand loyalty to achieve certain financial results at lower costs [5, 7].

D. Aaker and R. Jacobson [8] in a study evaluating the relationship between a brand and the financial performance of companies, concluded that there is a significant positive relationship between brand quality improvement and stock returns. In this study, the brand's potential for value creation was first identified and the significant influence of brand quality on the company's market value was substantiated.

Later R. Kerin and R. Sethuraman [9] investigated the influence of brand value on several financial indicators. Their results demonstrate a positive relationship between brand value and the ratio of a firm's market value to its book value. According to other studies (for example, M. Barth, M. Clement, G. Foster and R. Kasznik [10]) brand value is positively related not only to the variables calculated from the financial statements but also to the prices of shares and their returns. Based on the approach used in this study, T. Madden, F. Fehle and S. Fournier [11] concluded that brands with higher value bring greater returns to shareholders with less risk.

In general, it should be noted that the researchers also found a positive influence of the brand on such indicators as Tobin's Q [6, 12], cash flows [12, 13], sales revenue [14], return on investment [13], EBITDA [15], net income and book value of capital [10]. Researchers quite unambiguously agree that a brand is a significant predictor of a company's financial performance [11, 16].

Impact of CSR on financial performance

A large amount of scientific literature is devoted to the study of the relationship between CSR and the financial performance of companies. For example, a review article by J. Margolis, H. Elfenbein, J. Walsh [17] contains information that 167 studies from 1972 to 2007 analyze the relationship between CSR and financial performance. Herewith, the standard approach in these studies is the regression of financial indicators (Tobin's Q, return on assets, etc.) on CSR indicators (for example, the social efficiency index is used (Kinder, Lydenberg and Domini, hereinafter referred to as "KLD").

Moreover, while the early works in the study of the relationship between CSR and financial indicators showed a negative relationship, then later ones recognize the value and influence of CSR on financial indicators. For example, C. Flammer [18] presents the results of his empirical study on the impact of CSR on financial performance, assessing the impact of shareholder CSR proposals on shareholder income and other variables reflecting financial performance, and finds that the adoption of CSR proposals has a positive impact on labor productivity and sales growth. This is consistent with the views of many authors on the consideration of CSR as a resource that can improve efficiency, competitiveness, influence the reputation and brand (see, for example, [19–21]).

Thus, studies over the past 20 years indicate that CSR, similar to a brand, can be a determining factor affecting a company's financial performance.

Relationship between CSR initiatives, company brand, and financial performance

In 2015, the authors of the study D. Wang, P. Chen, T. Yu, C. Hsiao [22] attempted to identify the influence of CSR on the relationship between firm performance and brand equity. However, this work did not achieve the expected result: the study was carried out on a sample that included data on high-tech traded companies in Taiwan for 4 years (from 2010 to 2013). At the same time, the brand value was estimated by researchers using the Hirose model, and the

CSR variable was constructed on their own, based on the Dow Jones Sustainability Index method. To form the CSR variable, four CSR dimensions were considered: economic, social, environmental, and corporate governance. As a result, a general CSR index was formed, including each of the measurements with equal weight. To study the causal relationship between CSR, brand value, and financial performance, the authors used a structural equation modeling, and it was found out that brand value does not affect the relationship between CSR and financial performance. The lack of correlation is possibly due to the fact that the authors used their own, unproven methodology for assessing CSR.

Later, research was conducted by M. Rahman, M. Rodríguez-Serrano, M. Lambkin [23], dedicated to the study of the relationship between CSR, brand, and firm performance on a sample of 62 American companies over 14 years — from 2000 to 2013. In the model, the authors used generally accepted data: to describe the brand value — estimates of the brand consultancy Interbrand, CSR data — from the KLD database, and financial indicators — from the COMPUSTAT database. Brand value has been shown to have a positive impact on a company's current market-based performance, measured by market share, as well as on future financial performance, measured by Tobin's Q. In addition, the findings indicated a significant interaction effect between brand value and the CSR variable, which suggests that the relationship between brand value and the firm performance is enhanced when the company invests in CSR.

Thus, it can be argued that the issue of the impact of CSR on the relationship between brand and firm performance has not yet been widely studied. Moreover, in the studies carried out, the authors obtained varying results, which indicates that at the moment there is no consensus regarding the impact of CSR. Therefore, we consider it appropriate to conduct a study wherein we attempt to assess the impact of CSR on the relationship between brand value and financial performance.

STATEMENT OF THE PROBLEM AND HYPOTHESES OF THE RESEARCH

Our research is aimed at determining the impact of CSR on the relationship between brand value and financial performance (*Fig. 1*), we assume that this relationship is enhanced when companies invest in CSR activities.

As part of our data analysis, we test hypotheses about the influence of the brand on the firm performance and try to find the moderating effect of CSR on this relationship.

Hypothesis 1: Brand value growth has a positive effect on financial performance.

In most empirical studies, to reflect the firm performance, financial indicators are used, calculated based on the accounting data, rather than market-based indicators [24, 25]. We also choose return on assets (ROA) and return on equity (ROE) as financial indicators, since they are one of the most frequently used financial indicators that act as exogenous variables in the relevant literature and reflect the firm performance [26]:

- ROA acts as an indicator reflecting the company's potential for generating cash flows in the future, and is an indicator of the stability of the company's financial position;
- ROE is a measure of profitability and is of great interest to shareholders.

Hypothesis 1.1: Brand value growth has a positive effect on return on assets.

Hypothesis 1.2: Brand value growth has a positive effect on the company's return on equity.

Within the framework of this study, it was decided to assess the influence of brand value not only on the financial ratios calculated based on the financial statements but also on the company's market value. It is believed that an increase in brand value drives its awareness in the market, which, in turn, leads to the growing attention from potential investors, and has an ultimately positive effect on the company's market value.

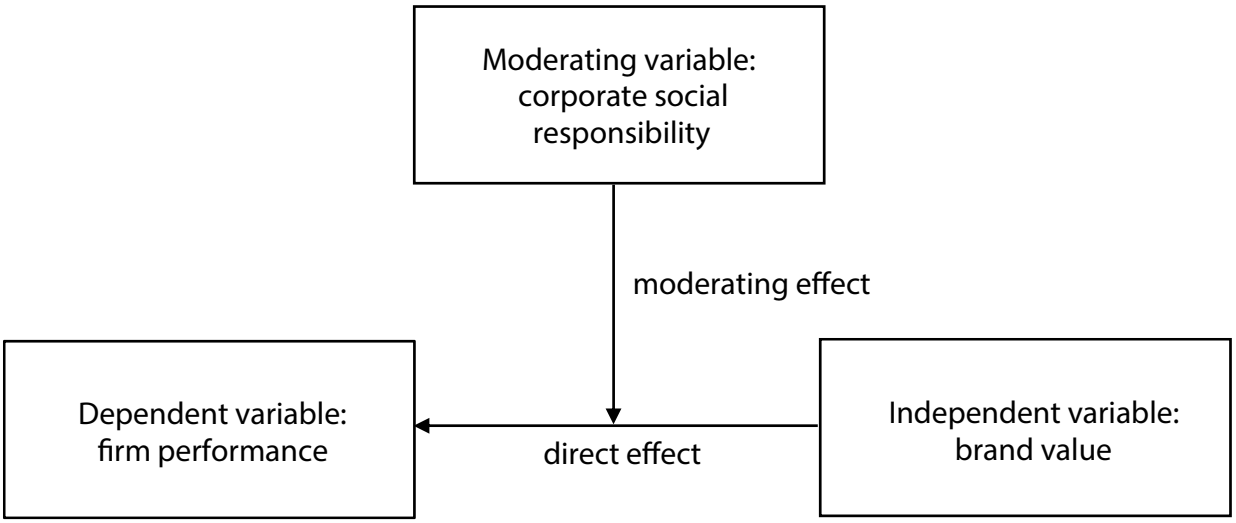

Fig. 1. **Expected relationship between exogenous and endogenous variables**

Source: compiled by the authors.

Hypothesis 1.3: Brand value growth has a positive effect on the company's market value.

According to stakeholder theory, stakeholders reward those companies that perform well in CSR activities and treat unfavourably companies that perform poorly in this area [27]. It can be argued that companies can consider CSR activities as some kind of investment, assuming that the CSR activities they have performed will enable them to achieve better financial results, so we test the following hypothesis:

Hypothesis 2: The actions of companies in the field of CSR have a positive effect on the relationship between brand value and financial performance. We test the impact on three financial metrics:

Hypothesis 2.1. CSR activities have a positive effect on the relationship between brand value and a company's return on assets.

Hypothesis 2.2. CSR activities have a positive effect on the relationship between brand value and a company's return on equity.

Hypothesis 2.3. CSR activities have a positive effect on the relationship between brand value and the company's market value.

Companies with higher brand value are more likely to participate in CSR activities on a proactive basis in order to inform the market that they are more socially responsible market participants than their competitors [28]. CSR initiatives undertaken by such companies will be more visible to stakeholders as opposed to companies with lower brand value, as strong brands have a higher level of market awareness. It follows that, by attracting more stakeholder attention, firms with relatively higher brand value may result in greater CSR benefits than firms with lower brand value [27].

Companies with high brand value receive a more favorable response from stakeholders regarding their CSR activities compared to firms with low brand value, which suggests that there is a positive interaction effect between brand value and CSR. In other words, the performance of two hypothetical firms with the same brand value will vary depending on the extent to which these firms invest in CSR activities and how effectively they use these activities in order to enhance their reputation and improve relationships with key stakeholders [23].

DATA

A sample of US companies was formed for the study, since the CEOs of US companies announced the decision to change the main corporate goal, which suggests that a certain

consensus has been reached in the community on measuring CSR indicators. The sample included companies for which brand value estimates were provided by the Interbrand consulting agency. Thus, the initial sample, based on the publicly available data, contained 1,064 observations of 90 companies for the period from 2000 to 2019.

As a proxy for CSR, following previous studies (H. Wang, S. Sengupta [6], G. Giannarakis [29], A. Dardour, J. Husser [30]), we used the ESG (Environmental, Social and Governance) rating, which is calculated by analysts and is designed to objectively and accurately measure the company's CSR activities in three aspects: environmental protection, social sphere and economy. The source was the Thomson Reuters Eikon database.

Indicators such as return on assets (ROA), return on equity (ROE), market value were considered as dependent variables.

Control variables are R&D, advertising, general selling and administrative expenses, the book value of assets, average number of employees, leverage, and industry.

The source for the dependent and control variables was the Thomson Reuters Eikon database. However, not every company in our sample was happen to have the necessary data for all 20 years, and therefore observations were removed from the original sample for which there is not a large amount of data. In particular, brand value estimates such as Compaq, LinkedIn, Sun Microsystems, The Wall Street Journal, TIME, and Wrigley have been removed due to lack of data on variables of interest, as well as several companies that were absorbed, as a result of which information on the firm performance was also unavailable.

In addition, several companies have a large number of brands, each of which is individually assessed by a consulting agency. For example, Coca-Cola Co. is a manufacturer of beverage brands such as Coca-Cola and Sprite. Both of these brands were present in the sample and, since it is possible to consider the financial indicators only for the Coca-Cola Co company taken as a whole, such observations were excluded.

Further, in the course of the preliminary analysis of the data, restrictions were imposed on the variable responsible for financial leverage, and the final sample was reduced to 962 observations from 2000 to 2019 of 78 companies from 32 industries.

For the convenience of further use of the variable responsible for belonging to the industry, it has been transformed into a categorical variable (*Fig. 2*), which takes on the value 1 if the company belongs to a consumer-oriented industry (goods and consumer services), 0 — otherwise (according to the Global Industry Classification Standard — GICS).

Descriptive statistics for the quantitative variables included in the final sample are given in *Table 1*, the Jarque-Bera test showed that the distribution of a set of values of variables does not violate the normal law.

The average brand value of the sample is $ 17,970.19 million. The average CSR score is 69.51, while the lowest value of this indicator is 20.78. On average, the return on assets of the firms in the sample is 9%, the return on equity is 29%, the market value of the average company in the sample is $ 107,141.18 million, and the revenue is $ 36,939.28 million, of which $ 6,735.57 million are allocated to selling and administrative expenses.

The performed check for the presence of multicollinearity showed that there is no strong correlation between the endogenous variables, which prevents the building of models (*Table 2*).

RESEARCH METHODOLOGY

The final sample is panel dataset; therefore, linear multiple regression was used for its analysis, formula (1):

$$y_{it} = a_{it} + x'_{it}\beta + u_{it}, \quad (1)$$

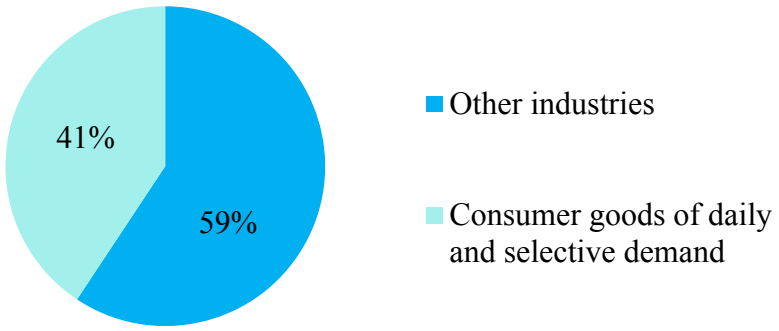

Fig. 2. **Industrial distribution of the companies in the sample**

Source: compiled by the authors based on the sample.

where: y_{it} — the dependent variable (financial performance of company i at time t, expressed in terms of return on assets, return on equity and market value), where $i = 1,\ldots n$ — the index of the object (company), $t = 1,\ldots T$ — the time index (period under consideration: 2000–2019);

a_{it} — the individual effect of the i-th object;

x'_{it} — a set of explanatory variables (brand value, CSR and a vector of control variables), which is a vector of dimension K, where K — the number of features;

β — a vector of coefficients of dimension $K \times 1$;

u_{it} — random observation errors.

The regression formula is used in this study to analyze three mathematical models.

Model A. "Return on assets":

$$ROA_{it} = f(Brand\,Value; ESG; Brand\,Value * ESG; SGA / TA; D / E; Ind; Lag(ROA); Revenue / Number\,of\,employees) + u_{Ait}.$$

Model B. "Return on equity" is a regression with fixed individual effects, the dependent variable in which is ROE, the set of explanatory variables in this model coincides with the previous regression model:

$$ROE_{it} = f(Brand\,Value; ESG; Brand\,Value * ESG; SGA / TA; D / E; Ind; Lag(ROE); Revenue / Number\,of\,employees) + u_{Bit}.$$

Model C. "Market value":

$$MV_{it} = f(Brand\,Value; ESG; Brand\,Value * ESG; SGA / TA; D / E; Ind; Revenue / Number\,of\,employees) + u_{Cit}.$$

To obtain effective estimates, it was decided to build several specifications for each model and choose the model where estimates will be consistent, unbiased, and efficient. To establish the desired relationship, we used a model with fixed individual effects, based on the assumption that each company has individual characteristics (unobserved heterogeneity) that can bias estimates of predictors or dependent variables, which leads to a correlation between the random error of the object (company) and explanatory variables. The fixed effects model allows us to eliminate the influence of these time-invariant characteristics and makes it possible to assess the net effect of endogenous variables on the dependent.

Endogeneity testing was carried out using the Hausman specification test, which tested the hypothesis that there was no correlation between individual effects and explanatory variables.

In addition, within the framework of our study, the fixed effects model was evaluated with the inclusion of both individual (specific for certain observations, but constant in time) and time (specific for a certain period of time, but constant for observations) effects, since it can be argued

Table 1

Descriptive statistics for companies in the sample

Variable	Unit	Average	Standard deviation	Min. value	Max. value	p-value (Jarque-Bera test)
Dependent variables						
Return on assets (ROA)	unit	0.09	0.07	–0.48	0.35	0.0000
Return on equity (ROE)	unit	0.29	0.26	–0.83	3.13	0.0000
Market value (MV)	USD million	107141.18	132978.25	685.80	1304764.77	0.0000
Brand measure						
Brand value	USD million	17970.19	24284.11	1235.00	234241.00	0.0000
CSR measure						
ESG score	unit	69.51	15.00	20.78	97.66	0.0000
Control variables						
Total assets (TA)	USD million	179113.64	416040.15	1491.55	2687379.00	0.0000
Selling, general and administrative expenses (SGA)	USD million	6735.57	7092.73	218.00	61323.00	0.0000
Selling, general and administrative expenses/ Total assets (SGA/TA)	unit	0.19	0.17	0.00	1.00	0.0000
Financial leverage (D/E)	unit	1.47	2.24	0.00	15.20	0.0000
R&D expenses	USD million	3742.62	4438.89	22.00	35931.00	0.0000
R&D expenses/TA	unit	0.06	0.04	0.00	0.19	0.0000
Revenue	USD million	36939.28	39763.90	203.00	291252.00	0.0000
Number of employees	unit	110674.71	110998.64	2625.50	722750.00	0.0000
Revenue/Number of employees	unit	0.52	0.44	0.00	3.29	0.0000

Source: compiled by the authors.

that for the companies in the sample, there are some unobservable time effects (e.g., business cycles) and company-specific effects that are constant over time (e.g., corporate culture, business practices, etc.). To check the feasibility of including such effects, an F-test was performed.

Since our study assumes that CSR affects the relationship between the brand and the firm performance, the models include the interaction effect to test this relationship. This effect is observed in cases when the influence of the independent variable x (within the framework of this study, this

Table 2

Correlation matrix of the dependent and explanatory variables

	ROA	ROE	MV	BV	ESG	TA	R&D	R&D / TA	SGA	SGA / TA	D / E	Rev / N
ROA	1.00											
ROE	0.39***	1.00										
MV	0.12***	0.00	1.00									
BV	0.16***	0.08**	0.77***	1.00								
ESG	0.08**	0.07*	0.25***	0.25***	1.00							
TA	−0.36***	−0.27***	0.23***	0.04	0.13***	1.00						
R&D	0.18***	0.08	0.81***	0.71***	0.38***	0.74***	1.00					
R&D / TA	0.00	−0.19***	0.25***	0.18***	0.06	0.02	0.52***	1.00				
SGA	0.01	0.01	0.61***	0.45***	0.37***	0.19***	0.64***	0.14***	1.00			
SGA / TA	0.25***	0.20***	−0.22***	−0.20***	−0.10***	−0.36***	−0.11**	0.17***	−0.02	1.00		
D / E	−0.38***	0.14***	−0.12***	−0.10***	−0.04	0.65***	−0.21***	−0.37***	−0.11***	−0.17***	1.00	
Rev / N	0.05	−0.10**	0.39***	0.24***	−0.23***	0.29***	0.19***	0.00	0.13***	−0.32***	0.13***	1.00

Source: compiled by the authors.

Note: ***, **, * — significance at the 1, 5 and 10% level respectively.

is the brand value) on the dependent variable y (the financial performance of the company) changes depending on the moderating variable z (CSR level).

The same set of control variables was used in the models we evaluated. We control for the size of the firm, since this parameter can significantly affect the financial performance of companies: the larger the firm, the greater the number of resources and opportunities it has to maintain a competitive advantage due to economies of scale [31]. In the literature, usually the following options for accounting for this parameter are offered: the natural logarithm of total assets [23], sales proceeds [6, 13] or the average number of employees in a company [12, 14, 32]. Thus, the size of the firm in our models was estimated in turn using these variables. Evaluated models include those predictors that show the strongest correlation with each of the dependent variables.

The researchers also point to the need to include variables reflecting advertising and R&D expenditures as controls. As an important component of the brand promotion process, advertising can increase brand awareness and significantly improve the brand image, so that the company's products will compare favorably with those of its competitors [33]. Thus, the company will be able to set a higher price for its products in comparison with the competitor's products with identical characteristics, which ultimately can have a positive impact on the company's financial performance. Concerning R&D expenditures, many studies confirm that this parameter, along with company size, risk, past financial performance, and industry affiliation, is a reliable predictor of company performance [34–38]. However, given that many companies do not disclose data on advertising expenditures, and more than half of the values for R&D expenditures are not available (the number of missing values corresponds to 58.63%), it is inappropriate to use these variables in this study. In this case, the generally accepted alternative is to use general selling and administrative expenses as a proxy for advertising costs [6, 39]. To exclude

the possible presence of economies of scale due to the use of this variable in its original form, general selling and administrative expenses were normalized by total assets. The resulting indicator is interpreted by some authors as the intensity of sales [23].

Following previous studies, as a control variable, we use financial leverage, calculated as total liabilities to equity, as a proxy of risk [23, 38].

In addition, the researchers suggest taking into account such a parameter as labor productivity [23]. It is obvious that employees have a significant influence on the company's performance, due to which higher labor productivity guarantees the higher financial performance of the company. The ratio of revenue to the number of employees acts as a proxy to this parameter.

Finally, given that the current values of the company's financial indicators are highly dependent on the past ones [38], namely, the financial ratios tend to converge to the average value, i.e. high (low) values are usually followed by lower (higher) values [37]; it is also necessary to control for the lagged value of the exogenous variable used in the model. Therefore, the model with the dependent variable of return on assets includes the return on assets of the previous year as a control one. The past values of other exogenous variables are considered in a similar way. Thus, the indicators described above are the part of the set of control variables included in the models of our study. It seems possible to include industry affiliation only in the model with time effects.

DESCRIPTION OF RESULTS

Model A. "Return on assets"

The first specification is a pooled regression model where the dependent variable is ROA. This model was built as a default one, however, it should be noted that this model does not consider the panel dataset structure, in particular, individual differences between companies.

As explanatory variables, the model included brand value, ESG score, the logarithm of sales revenue as a proxy of company size, financial leverage, industry affiliation, the share of general selling and administrative expenses in total assets, one year lagged ROA, and the ratio of revenue to the number of employees.

The specifications of model A considered by us are presented in *Table 3*: specification (1) is a pooled regression, specifications (2), (3), (4), and (5) are models with fixed individual effects (the results of the conducted Hausman specification test indicate the advisability of using models with fixed effects). Specification (2) included the same explanatory variables as a specification (3), except for the interaction effect. This was done in order to assess the contribution of the interaction effect of brand value and CSR to the explanation of the variance of the dependent variable. All the constructed model specifications were estimated using the least squares method (OLS), whereby specifications (1), (2), and (3) are linear-log: the return on assets is the dependent variable in them. In specifications (4) and (5), the logarithm of the return on assets acts as an exogenous variable, and model (5) is completely logarithmic.

As criteria for assessing the quality of models, we consider the coefficient of determination and the p-value of the F-statistic. According to the value of the F-statistic, all presented models are significant. According to the value of the determination coefficient, the best specification is (1). However, since this model was assessed as a default one and does not consider the presence of individual differences between companies, we will define the model of the highest quality without taking into consideration the pooled regression. Thus, the highest proportion of the explained variance of the dependent variable is demonstrated by the specification (4). It should be noted that during the transition from one specification to another, the signs of the estimates of the

Table 3

Comparison of the quality of regression models with the dependent variable of return on assets

Regressors	(1)	(2)	(3)	(4)	(5)
Brand value		−0.000000493***	−0.00001431***		
Brand value logarithm					
CSR	0.00026*				
CSR logarithm					−2.30326**
Interaction effect between brand value and CSR			0.000000012*	0.00000015*	
Interaction effect between brand value and CSR (logarithm)					0.24466*
Total assets logarithm					−0.54532***
Sales revenue logarithm		0.02130***	0.02349***		
Industry					
Financial leverage	-0.00410***	−0.00336**	−0.00353**		
Financial leverage logarithm					−0.21292**
Ratio of selling, general and administrative expenses to total assets	0.03422***	0.21983***	0.22269***	1.92972***	
Ratio of selling, general and administrative expenses to total assets (logarithm)					
Revenue/Number of employees ratio	0.01314***		0.04221***	0.46876***	
Revenue/Number of employees ratio logarithm					0.38581***
ROA value in the past period	0.71920***			3.29819***	
ROA value in the past period (logarithm)					0.12366***
Constant					
$prob(F-stat.)$	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.6672	0.1189	0.1241	0.1658	0.1503
Number of observations	610	639	639	599	589

Source: compiled by the authors.

Note: ***, **, * – significance at the 1, 5 and 10% level respectively. The table presents only significant variables. Newey-West standard error correction for estimates was conducted to get heteroskedasticity and autocorrelation consistent estimators. The obtained estimates are unbiased, consistent and inefficient for all specifications except the first one.

coefficients do not change, which is evidence of the quality of the constructed models.

Specification (2) was considered in order to estimate the contribution of the interaction effect included in the model later. Thus, during the transition from one regression to another, an increase in the adjusted coefficient of determination is observed, albeit insignificant. This indicator controls for the number of variables included, so it can be argued that considering the interaction effect between brand value and CSR helps to explain a greater proportion of the variance of the dependent variable.

The presented above results show that, contrary to expectations, *hypothesis 1.1*. on the positive effect of brand value on return on assets has not been confirmed. In three specifications, the brand value was found to be insignificant, but in the other models, the negative significant coefficient is observed. This result contradicts previous studies. Thus, in the work of A. Krasnikov, S. Mishra, D. Orozco [12], a positive influence of the brand on ROA was found. This may be due to the method used to measure the brand, as in this study, trademarks were used as a proxy to the brand, and not the brand value estimates provided by the consulting agency.

However, our *hypothesis 2.1*. on the positive impact of CSR on the relationship between brand value and such financial results as return on assets was confirmed. Thus, in three specifications, the interaction effect of brand value and CSR turned out to be significant. This suggests that for companies with different CSR levels, the influence of brand value on return on assets is different. A positive significant coefficient indicates that with a higher CSR, there is a stronger relationship between the brand value and return on assets, while with a lower CSR level, there is a weaker relationship between the brand and the specified indicator, i.e. the impact of brand value on return on assets is enhanced if the company has a higher level of social responsibility.

When analyzing the impact of CSR on the return on assets, specification (1) indicates that with an increase in the value of CSR, an increase in the return on assets is observed. At the same time, in the model (5), a negative influence of the company's initiatives in the framework of CSR on the return on assets was obtained. This effect can be explained by the fact that companies spend additional funds to implement such initiatives. It should be noted that the observed uncertainty in the impact of the company's level of social responsibility on the return on assets is consistent with the findings of previous studies. The reason for this may be the lack of a comprehensive measure to assess companies' performance in the field of CSR.

A number of control variables were also included in the regression models, to which the focus of this study is not limited, but the influence of which should be considered based on the opinion of many researchers on the issue under consideration. As expected, ROA increases as the company's investment in advertising grows. A 1 unit increase in the ratio of general selling and administrative expenses to total assets on average and all other things being equal, leads to approximately 6% growth in the company's return on assets. The same results were obtained in previous studies [6, 39].

The influence of leverage, which was included in the regressions as an indicator of risk, testifies to the negative effect of financial leverage growth on the company's return on assets. So, a 1% increase in the ratio of total liabilities to equity results in an average of 0.21% decrease in ROA. We can say that such a result was also expected and is consistent with common sense. Despite the fact that debt financing is cheaper for companies than their own, the growth of financial leverage leads to the fact that the company's capital structure becomes more risky, which negatively affects the return on assets.

All specifications show a positive impact of labor productivity on ROA. A 1 unit increase

in the ratio of revenue to the number of employees on average and all other things being equal leads to a 0.59% increase in return on assets. The authors of studies in the relevant literature have also obtained a positive effect of this parameter on financial results [23].

Another control variable that has a positive impact on the return on assets was the one year lagged ROA. So, a 1 unit increase in the past ROA will on average lead to approximately 26% increase in the current ROA. This effect is consistent with the findings of the researchers that the current values of the company's financial indicators are highly dependent on the past ones [38].

Model B. "Return on equity".

We have considered five specifications of the model; the results are presented in *Table 4*: (1) — pooled regression, (2) and (3) are linear-log, and in the specification (2) all predictors of the model (3) act as explanatory variables, except for the interaction effect, which will allow us to estimate the contribution of this effect to the explanation of variance of dependent variable. The return on equity acts as an exogenous variable in specifications (1), (2), and (3), the logarithm of ROE — in specifications (4) and (5), and specification (5) is completely logarithmic.

All the obtained regression models, except for the first one, are fixed effects models, the feasibility of using which was verified by the Hausman specification test. The models were estimated using OLS.

In accordance with the results (*Table 4*), it can be argued that all the constructed models are significant, in addition, the specifications retain the signs of the coefficient estimates, which indicates the quality of the constructed models. Among the specifications, the best result in terms of the coefficient of determination, as in the case of regressions with the dependent variable ROA, is demonstrated by the pooled regression model: the proportion of the explained variance of the dependent variable corresponds to 77%. However, given that this model does not take into account the presence of individual differences between companies, let's compare the quality of the other models. Thus, the variance of the dependent variable is best explained by the model (5), while in the other models the proportion of variance explained is approximately equal to 26%.

Our *hypothesis 1.2.* on the impact of brand value on return on equity has been confirmed. Brand value has a positive effect on ROE — this result is observed in four specifications: a 1% increase in brand value on average, and all other things being equal, leads to 0.82% increase in ROE.

Contrary to expectations, *hypothesis 2.2.* which assumes that the value of CSR strengthens the relationship between brand value and such a financial result as return on equity has not been confirmed. The interaction effect of brand value and CSR turned out to be insignificant in all specifications, i.e. the influence of brand value on ROE is the same for companies with different levels of CSR, the level of social responsibility of the company neither enhances nor diminishes the influence of the brand on the return on equity.

Three specifications confirm the positive impact of CSR on ROE: a 1 unit increase in the ESG score results in an increase in ROE by 0.0047 units on average.

Analysis of the control variables showed that, as in the case of ROA, advertising costs have a positive effect on the return on equity. A 1 unit increase in the ratio of general selling and administrative expenses to total assets on average and all other things being equal leads to an increase in ROE by about 0.28 units. In addition, a positive effect of financial leverage on ROE is observed. Furthermore, a significant effect of the firm size, proxied by the total assets, on ROE was revealed. Thus, a negative coefficient indicates that with an increase in the size of the firm, the return on equity decreases, this result is confirmed in all specifications.

Table 4

Regression models with dependent variable of return on equity

Regressors	(1)	(2)	(3)	(4)	(5)
Brand value		0.0000027***	0.0000069**	0.000014**	
Brand value logarithm					0.82356**
CSR		0.00395***	0.0047***	0.01398***	
CSR logarithm					
Interaction effect between brand value and CSR					
Interaction effect between brand value and CSR (logarithm)					
Total assets logarithm	−0.02668***	−0.10528***	−0.10695***	−0.25655***	−0.57920***
Number of employees logarithm					
Sales revenue logarithm					
Industry		−0.07954***	−0.08060***		
Financial leverage	0.01415***	0.07850***	0.07969***	0.13062***	
Financial leverage logarithm					0.58834***
Ratio of selling, general and administrative expenses to total assets		0.28448***	0.28670***	0.82393***	
Ratio of selling, general and administrative expenses to total assets (logarithm)					
Revenue/Number of employees ratio					
Revenue/Number of employees ratio logarithm					0.17688***
ROA value in the past period	0.81624***				
ROA value in the past period (logarithm)					
Constant	0.28187***				
$prob(F-stat.)$	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.7697	0.2628	0.2663	0.2623	0.3631
Number of observations	463	506	506	505	505

Source: compiled by the authors.

Note: ***, **, * — significance at the 1, 5 and 10% level respectively. The table presents only significant variables. Newey-West standard error correction for estimates was conducted to get heteroskedasticity and autocorrelation consistent estimators. The obtained estimates are unbiased, consistent and inefficient.

Model C. "Market value".

We have considered four specifications of the model, the results are presented in *Table 5*: (1) — linear-log model, pooled regression, (2) — linear-log model with fixed individual effects. Specifications (2), (3), and (4) are models with fixed individual effects, with the dependent variable in models (3) and (4) being

Table 5

Regression models with a market cap dependent variable

Regressors	(1)	(2)	(3)	(4)
Brand value			0.00001*	
Brand value logarithm				0.58205*
CSR			0.00494**	
CSR logarithm				
Interaction effect between brand value and CSR	0.03953***	0.03554***		
Interaction effect between brand value and CSR (logarithm)				
Total assets logarithm	35 799.75***	36 213.85***		0.45181***
Number of employees logarithm				
Sales revenue logarithm			0.40010***	
Industry				
Financial leverage	−15 980.70***	−16 777.81***	−0.03111**	
Financial leverage logarithm				−0.18247***
Ratio of selling, general and administrative expenses to total assets	107 204.37***	120 819.64***	−0.94222**	
Ratio of selling, general and administrative expenses to total assets (logarithm)				0.09935*
Revenue/Number of employees ratio	69 598.40***	65 591.03***		
Revenue/Number of employees ratio logarithm				
ROA value in the past period	−353 986.15***			
$prob(F-stat.)$	0.0000	0.0000	0.0000	0.0000
R^2	0.7498	0.7508	0.3405	0.5717
Number of observations	641	641	643	643

Source: compiled by the authors.

Note: ***, **, * — significance at the 1, 5 and 10% level respectively. The table presents only significant variables. Newey-West standard error correction for estimates was conducted to get heteroskedasticity and autocorrelation consistent estimators. The obtained estimates are unbiased, consistent and inefficient.

the logarithm of market capitalization, and the model specification (4) being completely logarithmic. All constructed models were also evaluated using OLS.

According to the results of the model evaluation (*Table 5*), all presented specifications are significant. The coefficient of determination shows that the best is the specification of the model (2): it explains the highest proportion of the variance of the dependent variable — 75%. In models (1), (3), and (4), this indicator corresponds to 74.9, 34, and 57%, respectively. It should also be noted that the signs of the coefficient estimates in the models are predominantly preserved during the transition from one specification to another, which indicates the quality of the constructed models.

Hypothesis 1.3. on the positive impact of brand value on market value was confirmed. This effect is found in two specifications. Thus, a 1% increase in brand value results in 0.58% increase in the company's capitalization on average and all other things being equal. Hence it appears that the company's investments in brand development, which contribute to the growth of brand equity, lead to an increase in the company's market value, and this, in turn, entails the attraction of many potential investors, which brings an increase of capital inflow into the company.

It can be argued that *hypothesis 2.3.* on the positive impact of CSR on the relationship between brand value and such a market indicator as capitalization has been confirmed: a significant interaction effect is observed in the two models. A positive coefficient indicates that a higher level of corporate social responsibility leads to a stronger relationship between the brand and market value, while a lower level of CSR results in a weaker relationship between the brand and the specified indicator. Thus, the influence of brand value on market value is enhanced if the company is characterized by high level of socially responsible and ethical behavior.

Analysis of the control variables showed that an increase in such a determinant as advertising expenditures results in an increase in market value (observed in all four specifications). Also, in all specifications, a negative effect of leverage on market value was found, which is quite logical, since, with the growth of financial leverage, the company's capital structure becomes more risky, and therefore, can negatively affect the interest of potential investors in the company, thereby leading to a decrease in its market value. The variable reflecting the size of the company has a positive effect on the market value: this is due to the fact that as the size of the company increases, the company's recognition in the market grows, which leads to the awareness of potential investors and increase their interest in relation to the given company and ultimately — to the growth of market value.

Thus, on the whole, it can be argued that the results obtained in the course of our study are relevant: the signs of the coefficient estimates do not contradict common sense and correspond to the conclusions of the researchers. Moreover, given that the significance of the parameter estimates is not lost, and the signs in the estimated models do not change during the transition from one specification to another, we can speak both about the robustness of the identified effects and the quality of the tested regressions.

LIMITATIONS AND FUTURE RESEARCH

Our study is no exception and has a number of limitations:

- due to the fact that the Interbrand agency evaluates only the most expensive brands, the sample formed for the study is characterized by a bias towards expensive companies. Consequently, the focus of this study is limited solely to large corporations that pay special attention to their brands and invest a significant amount of funds in their maintenance and development. Given this, it becomes impossible to generalize the identified effects to a population of all firms, and when conducting studies on samples that include more heterogeneous companies, other relationships between the brand, CSR and the results of companies' performance may be found;
- consulting agencies often separately estimate the value of several different brands that belong to the same company, however, to build a model, the financial performance of only one company can be used, despite the fact that it is assumed that when assessing the brand value, consulting agencies consider indicators for all companies to which the evaluated brand belongs;
- there is a limitation associated with the variable reflecting the company's CSR activities: at present, the company's CSR initiatives are assessed only on the basis of the company's degree of disclosure of information on these

activities due to the lack of a tool for assessing the quality of these practices, therefore, using this variable it is possible only to assess the disclosure degree by the company of information on these activities, and not the actual level of social responsibility and ethics of the company;

- the results obtained also cannot be generalized to the entire population due to the fact that companies from only one country are considered;
- in addition, it should be noted that some researchers suggest the lagged influence of branding on financial performance. By analogy with intellectual property rights, advertising, and R&D, actions of creating a brand, also through CSR, take some time to influence the company's performance.

CONCLUSIONS

Claims that companies with CSR activities have some advantages are already widespread both in the business press and in empirical research. The European Union has officially recognized the existence of the concept of CSR in corporate governance.

The theoretical contribution of this study is that, in contrast to most previous studies, which focused on the direct impact of CSR on a company's financial performance, we assume that there are also indirect effects. Moreover, in previous studies, the authors obtained conflicting results, which indicates that there is currently no consensus regarding the effect of CSR. Our main argument is that the company's CSR helps to increase brand value, which, in turn, has an impact on improving financial performance.

The effects revealed in the course of our study partly confirm the hypotheses put forward and serve as evidence of the existence of the effect of CSR on the relationship between brand value and financial performance. Thus, the hypothesis which assumes that companies with a higher CSR level have a stronger relationship between brand value and return on assets, i.e. the positive relationship between brand value and ROA is reinforced with large CSR initiatives by companies, was confirmed. It was also revealed that the relationship between brand value and the market value of a company is enhanced when the company, among other things, invests in CSR.

The findings of our research may be valuable for marketing specialists, owners, top managers, and investors, as well as may be used in the educational process. The effects found in the course of the study may serve as evidence of the importance of investing in the brand and participation of companies in CSR initiatives due to their significant impact on the financial performance of companies. Companies can use CSR initiatives as a tool for managing relationships with key stakeholders, and also as socially necessary initiatives and generally beneficial for the company.

In addition, since the role of corporate social responsibility is becoming more and more important, and the company's accomplishment of a certain public function can be encouraged by the state, the research materials may be used by public authorities to encourage the social responsibility of business.

REFERENCE

1. McWilliams A., Siegel D. Corporate social responsibility: A theory of the firm perspective. *The Academy of Management Review.* 2001;26(1):117–127. DOI: 10.5465/AMR.2001.4011987
2. Stiglitz J. Key challenges facing modern finance: Making the financial sector serve society. *Finansy: teoriya i praktika = Finance: Theory and Practice.* 2020;24(2):6–21. DOI: 10.26794/2587–5671–2020–24–2–6–21
3. Barney J., Wright M., Ketchen D.J. The resource-based view of the firm: Ten years after 1991. *Journal of Management.* 2001;27(6):625–641. DOI: 10.1177/014920630102700601
4. Ailawadi K.L., Lehmann D.R., Neslin S.A. Revenue premium as an outcome measure of brand equity. *Journal of Marketing*. 2003;67(4):1–17. DOI: 10.1509/jmkg.67.4.1.18688
5. Aaker D.A. Managing brand equity. New York: The Free Press; 1991. 299 p.

6. Wang H.-M.D., Sengupta S. Stakeholder relationships, brand equity, firm performance: A resource-based perspective. *Journal of Business Research*. 2016;69(12):5561–5568. DOI: 10.1016/j.jbusres.2016.05.009
7. Simon C.J., Sullivan M.W. The measurement and determinants of brand equity: A financial approach. *Marketing Science*. 1993;12(1):28–52. DOI: 10.1287/mksc.12.1.28
8. Aaker D.A., Jacobson R. The financial information content of perceived quality. *Journal of Marketing Research*. 1994;31(2):191–201. DOI: 10.2307/3152193
9. Kerin R.A., Sethuraman R. Exploring the brand value-shareholder value nexus for consumer goods companies. *Journal of the Academy of Marketing Science*. 1998;26(4):260–273. DOI: 10.1177/0092070398264001
10. Barth M.E., Clement M.B., Foster G., Kasznik R. Brand values and capital market valuation. *Review of Accounting Studies*. 1998;3(1/2):41–68. DOI: 10.1023/A:1009620132177
11. Madden T.J., Fehle F., Fournier S. Brands matter: An empirical demonstration of the creation of shareholder value through branding. *Journal of the Academy of Marketing Science*. 2006;34(2):224–235. DOI: 10.1177/0092070305283356
12. Krasnikov A., Mishra S., Orozco D. Evaluating the financial impact of branding using trademarks: A framework and empirical evidence. *Journal of Marketing*. 2009;73(6):154–166. DOI: 10.1509%2Fjmkg.73.6.154
13. Verbeeten F.H.M., Vijn P. Are brand-equity measures associated with business-unit financial performance? Empirical evidence from the Netherlands. *Journal of Accounting, Auditing & Finance*. 2010;25(4):645–671. DOI: 10.1177/0148558X1002500408
14. Agostini L., Filippini R., Nosella A. Brand-building efforts and their association with SME sales performance. *Journal of Small Business Management*. 2015;53(S 1):161–173. DOI: 10.1111/jsbm.12185
15. Gromark J., Melin F. The underlying dimensions of brand orientation and its impact on financial performance. *Journal of Brand Management*. 2011;18(6):394–410. DOI: 10.1057/bm.2010.52
16. Morgan N.A., Slotegraaf R.J., Vorhies D.W. Linking marketing capabilities with profit growth. *International Journal of Research in Marketing*. 2009;26(4):284–293. DOI: 10.1016/j.ijresmar.2009.06.005
17. Margolis J.D., Elfenbein H.A., Walsh J.P. Does it pay to be good? A meta-analysis and redirection of research on the relationship between corporate, social and financial performance. 2007. URL: https://www.academia.edu/750748/Does_it_pay_to_be_good_A_meta_analysis_and_redirection_of_research_on_the_relationship_between_corporate_social_and_financial_performance
18. Flammer C. Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science*. 2015;61(11):2549–2568. DOI: 10.1287/mnsc.2014.2038
19. Barney J. Firm resources and sustained competitive advantage. *Journal of Management*. 1991;17(1):99–120. DOI: 10.1177/014920639101700108
20. Hart S.L. A natural-resource-based view of the firm. *The Academy of Management Review*. 1995;20(4):986–1014. DOI: 10.5465/amr.1995.9512280033
21. Porter M.E., Kramer M.R. Strategy and society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review*. 2006;84(12):78–92.
22. Wang D.H.-M., Chen P.-H., Yu T.H-K., Hsiao C.-Y. The effects of corporate social responsibility on brand equity and firm performance. *Journal of Business Research*. 2015;68(11):2232–2236. DOI: 10.1016/j.jbusres.2015.06.003
23. Rahman M., Rodríguez-Serrano M.Á., Lambkin M. Brand equity and firm performance: the complementary role of corporate social responsibility. *Journal of Brand Management*. 2019;26(6):691–704. DOI: 10.1057/s41262–019–00155–9
24. Waddock S.A., Graves S.B. The corporate social performance-financial performance link. *Strategic Management Journal*. 1997;18(4):303–319. DOI: 10.1002/(SICI)1097–0266(199704)18:4%3C303::AID-SMJ869%3E 3.0.CO;2-G
25. Simpson W.G., Kohers T. The link between corporate social and financial performance: Evidence from the banking industry. *Journal of Business Ethics*. 2002;35(2):97–109. DOI: 10.1023/A:1013082525900
26. Palmer H.J. Corporate social responsibility and financial performance: Does it pay to be good? CMC Senior Theses. Paper. 2012;(529). URL: https://scholarship.claremont.edu/cgi/viewcontent.cgi?article=1502&context=cmc_theses#:~:text=Results%20also%20indicate%20that%20increased,a%20company%20with%20CSR%20initiatives

27. Jamali D. A stakeholder approach to corporate social responsibility: A fresh perspective into theory and practice. *Journal of Business Ethics*. 2008;82(1):213–231. DOI: 10.1007/s10551–007–9572–4
28. Lamberti L., Lettieri E. CSR practices and corporate strategy: Evidence from a longitudinal case study. *Journal of Business Ethics*. 2009;87(2):153–168. DOI: 10.1007/s10551–008–9876-z
29. Giannarakis G. The determinants influencing the extent of CSR disclosure. *International Journal of Law and Management*. 2014;56(5):393–416. DOI: 10.1108/IJLMA-05–2013–0021
30. Dardour A., Husser J. Does it pay to disclose CSR information? Evidence from French companies. *Management International*. 2016;20(Spec. No.):94–108. URL: https://www.erudit.org/fr/revues/mi/2016-v20-mi04839/1063708ar.pdf
31. Roberts P.W., Dowling G.R. Corporate reputation and sustained superior financial performance. *Strategic Management Journal*. 2002;23(12):1077–1093. DOI: 10.1002/smj.274
32. Gherghina S.C., Simionescu L.N. Does entrepreneurship and corporate social responsibility act as catalyst towards firm performance and brand value? *International Journal of Economics and Finance*. 2015;7(4):23–34. DOI: 10.5539/ijef.v7n4p23
33. Erickson G., Jacobson R. Gaining comparative advantage through discretionary expenditures: The returns to R&D and advertising. *Management Science*. 1992;38(9):1264–1279. DOI: 10.1287/mnsc.38.9.1264
34. Griliches Z. Issues in assessing the contribution of research and development to productivity growth. *The Bell Journal of Economics*. 1979;10(1):92–116. DOI: 10.2307/3003321
35. Gooding R.Z., Wagner J.A. A meta-analytic review of the relationship between size and performance: The productivity and efficiency of organizations and their subunits. *Administrative Science Quarterly*. 1985;30(4):462–481. DOI: 10.2307/2392692
36. Miles G., Snow C.C., Sharfman M.P. Industry variety and performance. *Strategic Management Journal*. 1993;14(3):163–177. DOI: 10.1002/smj.4250140302
37. Ruf B.M., Muralidhar K., Brown R.M., Janney J.J., Paul K. An empirical investigation of the relationship between change in corporate social performance and financial performance: A stakeholder theory perspective. *Journal of Business Ethics*. 2001;32(2):143–156. DOI: 10.1023/A:1010786912118
38. Shahzad A.M., Sharfman M.P. Corporate social performance and financial performance: Sample-selection issues. *Business & Society*. 2017;56(6):889–918. DOI: 10.1177/0007650315590399
39. Berman S.L., Wicks A.C., Kotha S., Jones T.M. Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *The Academy of Management Journal*. 1999;42(5):488–506. DOI: 10.5465/256972

ABOUT THE AUTHORS

Natal'ya Yu. Zhukova — Cand. Sci. (Econ.), Assoc. Prof., Department of Economics and Finance, HSE University, Perm branch, Perm, Russia
nuzhukova@hse.ru

Aigun E. Melikova — Master of Finance, HSE University, Perm branch, Perm, Russia
aigun_melikova@mail.ru

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Segmental Model for Comparing the Value of Organizations (Utility-Based)

D.N. Belykh
Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia
https://orcid.org/0000-0002-3825-4239

ABSTRACT

This paper presents a model for visualizing the organization's activities based on the market value-to-sales ratio (utility coefficient), which is a segmented two-dimensional diagram (utility diagram). The **aim** of the study is to develop measures to improve the quality and effectiveness of management decisions taken to implement the principles of sustainable growth of a company's capital value, considering the specifics of the business, with the identification of the optimal ratio of the structure of the balance of assets, costs and net profit with revenue, in order to find a compromise between the current value and development. The author used the following **methods**: financial ratios, statistical, balance, systematic and logical thinking, visual presentation. The **results** of the multivariate analysis indicate that there is a significant correlation between the utility and various ratios of financial reporting indicators for a representative sample of two hundred domestic and foreign companies. The article offers a model to assess the activities of organizations, including those not listed on the stock exchange, and correlate them using a matrix of key factors, according to their influence on the final cost of the business. The author **concluded** that the increase in the market value-to-sales ratio mainly depends on the profits of the asset, however, for different segments of the utility diagram, the influence of this factor is not the same. Effective strategies must be considered depending on the type of activity, then the productivity of solutions and their value for the market as a whole will increase significantly. The implementation of the model makes it possible to compare the dynamics of the activities of organizations with industry competitors for a selected period of time, at the strategic level to determine directions for increasing the utility coefficient, and in the future, it can be used as an alternative method for assessing the value of companies.

Keywords: capitalization; market interest; utility segment; profit; cost; provision; capital; intensity; dynamicity

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INTRODUCTION

Current ideas about increasing the value of a company are based primarily on the need to maximize its profits — the ability to generate income for stakeholders, considering the minimization of the weighted average cost of capital. In addition, the activities of organizations are assessed by the ability to produce other benefits (economic, social and environmental) that satisfy alternative aspects and create conditions for sustainable development of society.

The dependence of capitalization on profit, expressed by the correlation coefficient, within the sample of TOP 500 largest public companies of the last ten years, shown in *Fig. 1* broadly confirms the basic idea of increasing company value. However, the question of determining the optimal ratio of the structure of balance sheet assets, cost items and profits to sales (Profits/Sales) considering the need for the progressive development of the business, including its specifics, is one of the most relevant in the field of financial management.

Table 1 demonstrates a comparison of the leaders of the Forbes Global 2000 list for 2019 in terms of capitalization with corporations comparable to them in sales and profits. Obviously, in addition to the size of profit and the level of the Profits/Sales ratio, there are other factors related to the characteristics and intangible component of the activities of organizations [1, 2], which determine their market value.

If, within the entire list, we consider the dynamics of the average values of Market Value/Sales, Profits/Sales, Assets/Sales, Market Value/Assets of organizations depending on the size of their capitalization, then only the indicators of the ratio of assets to sales and market value to assets have a corresponding correlation with sample rank (USD million / USD million):

Rank 1–500: MV/S = 4.25; P/S = 0.15; **A/S = 5.41; MV/A = 3.29;**

Rank 501–1000: MV/S = 7.81; P/S = 0.21; **A/S = 7.38; MV/A = 1.96;**

Rank 1001–1500: MV/S = 1.66; P/S = 0.15; **A/S = 7.46; MV/A = 0.56;**

Rank 1501–2000: MV/S = 0.83; P/S = 0.21; **A/S = 14.37; MV/A = 0.14.**

To neutralize the factor of the scale of companies we present a similar comparison, sorted in descending order of the market value to sales ratio (USD million / USD million):

Sort 1–500: MV/S = 11.78; P/S = 0.47; A/S = 10.72; MV/A = 3.54;

Sort 501–1000: MV/S = 1.81; P/S = 0.14; A/S = 10.50; MV/A = 1.60;

Sort 1001–1500: MV/S = 0.74; P/S = 0.08; A/S = 9.31; MV/A = 0.63;

Sort 1501–2000: MV/S = 0.23; P/S = 0.03; A/S = 4.08; MV/A = 0.18.

In this case, all indicators have an obvious sequence of changes in values, respectively, this method of correlating companies (in terms of the market value to sales ratio) is generally indicative, but insufficient, considering their different profile and industry specifics.

From the above comparisons, the Assets/Sales indicator draws attention, which in the case of ranking by capitalization (Rank) has a negative correlation (decreases with an increase in the value of companies), and when sorted by the ratio Market Value/Sales has a positive one (increases with an increase in MV/S), which determines an unambiguous difference in the approaches to comparing companies when assessing their value (areas of activity, the total size of assets and its structure, financial state), which must be expressed and justified.

Accordingly, the search for patterns and specific qualities that determine the investment attractiveness of an organization will make it possible to implement a model of their management.

OVERVIEW OF THE SCIENTIFIC DEVELOPMENT OF THE TOPIC

Currently, business valuation methods are based on three main approaches: profit-based, cost-effective, and market-based.

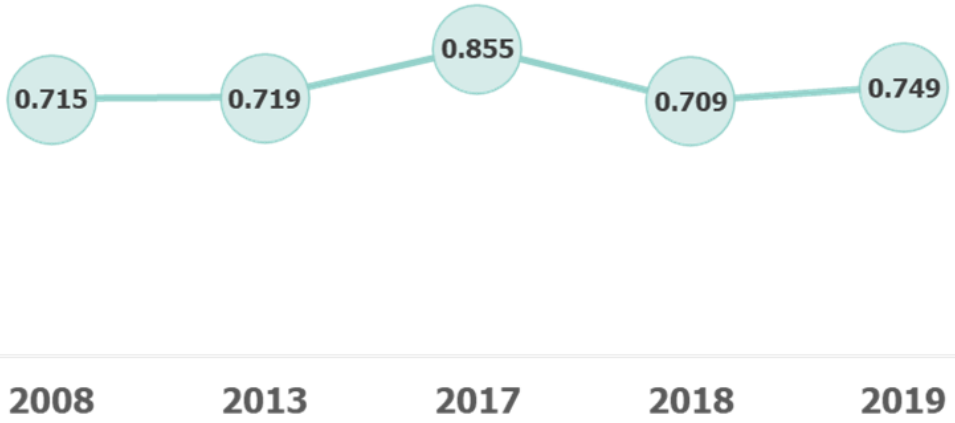

Fig. 1. **Dynamics of the correlation coefficient of market value and net profit indicators of TOP-500 world's largest public companies**

Source: compiled by the authors on the basis of Fortune 500, Forbes Global 2000.

Table 1

The ratio of financial indicators of the leaders of the world list of companies by capitalization, USD million

Rank	Company	Country	Market Value	Sales	Profits	Assets	Market Value / Sales	Profits / Sales	Market Value / Assets
1	Saudi Aramco	Saudi Arabia	1 684 800	329 800	88 200	398 300	5.11	0.27	4.230
2	Microsoft	United States	1 359 000	138 600	46 300	285 400	9.81	0.33	4.762
3	Apple	United States	1 285 500	267 700	57 200	320 400	4.80	0.21	4.012
4	Amazon	United States	1 233 400	296 300	10 600	221 200	4.16	0.04	5.576
5	Alphabet	United States	919 300	166 300	34 500	273 400	5.53	0.21	3.362
9	Berkshire Hathaway	United States	455 400	254 600	81 400	817 700	1.79	0.32	0.557
17	Samsung Electronics	South Korea	278 700	197 600	18 400	304 900	1.41	0.09	0.914
22	ICBC	China	242 300	177 200	45 300	4 322 500	1.37	0.26	0.056
23	Verizon Communications	United States	237 700	131 400	18 400	294 500	1.81	0.14	0.807
32	ExxonMobil	United States	196 600	256 000	14 300	362 600	0.77	0.06	0.542
41	Toyota Motor	Japan	173 300	280 500	22 700	495 100	0.62	0.08	0.350
90	Citigroup	United States	101 100	104 400	17 100	2 219 800	0.97	0.16	0.046

Source: Forbes Global 2000. URL: https://www.forbes.com/global2000/#63707f60335d/ (accessed on 28.11.2020).

The income approach involves the use of two methods of assessment: income capitalization or future income discounting based on the fundamental concepts of the time value of money and the relationship between risk and return [3–7]. It is effective for assessing the business value of a commercial organization.

The cost approach is most suitable for evaluating social facilities and new infrastructure projects. It shows the estimated value of the organization's equity capital (operating or undergoing liquidation) as the difference between the value of its assets and liabilities [6, 7].

The market-based (comparative) approach is effective with comparable objects and the sufficiency of data on them, it includes the methods of a similar company, transactions and industry coefficients.

The valuation of a business, like any other asset, based on comparison with a similar asset, the value of which is known, on the one hand, agrees well with common sense, and on the other hand, it is based on the following fundamental theoretical premises [6]:

- the principle of alternative value;
- the hypothesis about the reflection in the market price of an asset in developed markets of fair market value;
- the existing relationship between the main indicators of the company's performance and its market value, the assumption that for similar companies these ratios should be close.

The comparative approach can be used in assessing the value of non-joint-stock organizations by comparing them with peers that place their shares on the stock market. In addition, according to the listed corporations, one can judge about their overvaluation or undervaluation [6].

The basis of the market-based approach is the use of multiples to neutralize the factors of company size and number of shares. The most used of them are [6]:

- MV/S (Market Value/Sales);
- EV/EBITDA (Enterprise Value/Earnings Before Interest, Tax, Depreciation, Amortization);
- EV/NOPAT (Enterprise Value/Net Operating Profit after Tax);
- MV/E (Market Value/Equity);
- MV/P (Market Value/Profits).

There are studies that link the growth in the value of companies with the quality of corporate governance [8], the amount of capital [9–11], the size of net assets [12], net profit [13], economic profit [14], the number of employees [15, 16], social and environmental conditions of economic activity [17].

An overview of the factors of sustainable growth of Russian companies is given in the work of E.V. Ryabova, M.A. Samodelkina [18]. Non-financial factors of increasing the value of organizations are considered in the works of M. Ararat, B.S. Black, B.B. Yurtoglu [19], J. Garcia-Madariaga, F. Rodriguez-Rivera [20], F. Belo, X. Lin, M.A. Vitorino [21].

In terms of researching the financial performance of companies, it is worth noting E. Altman's seven-factor model [22], which, based on various ratios and characteristics of cash flows, makes it possible to determine the future solvency of an organization in the next five years with a probability of 70%.

ANALYSIS METHODOLOGY AND MODEL BUILDING

At first glance, in terms of comparing companies, the Market Value/Profits ratio is the most appropriate. However, the profits most of all depend on the internal accounting of the organization [23], the taxation system, market conditions, and, as it was said, do not always reflect the objective value of the asset.

The market value to sales ratio (MV/S), which is least affected by the human factor in the formation of internal reporting, is fairly universal and applicable to almost all listed companies. Sales contain almost a complete set of factors for assessing the performance of an organization.

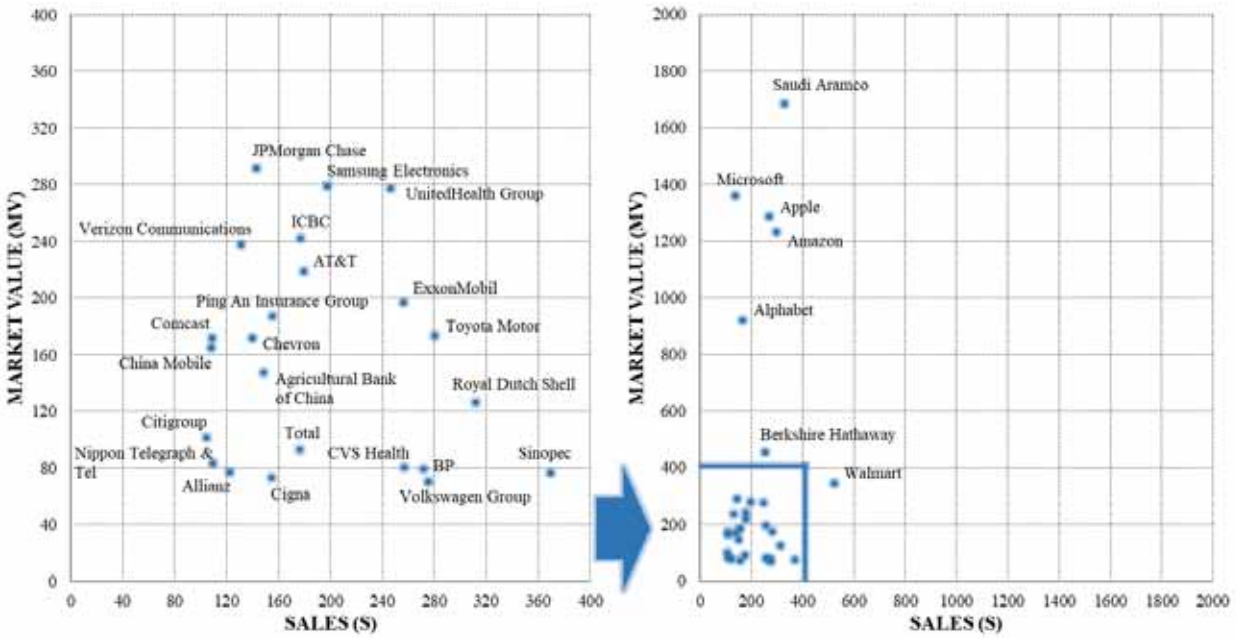

Fig 2. **Comparison of selected companies by MV/S, USD billion**

Source: compiled by the authors on the basis of Forbes Global 2000.

In addition, MV/S has a physical meaning in addition to financial.

Based on the analogy of the functionality of any mechanism, the cost of the organization will be comparable to the cost of the alternative value, which can be expressed in terms of the degree of the benefit obtained from its ownership. Thus, the specific value is the equivalent of the efficiency: the ratio of useful work to perfect work, or the proportion of goods created (creation) in relation to the amount spent (consumption).

Accordingly, if we consider these indicators in a two-dimensional coordinate system, where the abscissa will be consumption and the ordinate will be creation, their ratio will be equivalent to the tangent of the angle α to the consumption axis in the form of the hypotenuse of a right triangle, where the legs are the corresponding values of the axes of consumption and creation.

Consumption is an estimate of the total amount of goods used for the period that satisfy the current needs of the manufacturer, which is expressed by the indicator of the organization's revenue — development, use (including profit).

Creation is the aggregate value of intangible benefits that an asset produced as a result of its activities or is potentially capable of producing over a certain period, expressed by an indicator of its market value (capitalization) — transformation, improvement of the surrounding reality.

Thus, the Market Value/Sales ratio is equivalent to the asset's creativity level or its utility value.

By comparing companies from the Forbes Global 2000 list with sales over $ 100,000, assets over $ 120,000, and market value over $ 70,000 in the market value versus sales diagram (*Fig. 2*), we get a comparison, which is clearly perceived only in the direction of the dimensions of the axes themselves: the most expensive and with the highest sales. To visualize the MV/S ratio on this diagram, you need to draw a line from the point of intersection of the axes to the point of the selected company, which complicates the process. Another option is to divide the diagram into separate sections (segments) according to criteria characterizing the activities of organizations, taking into account their objective state.

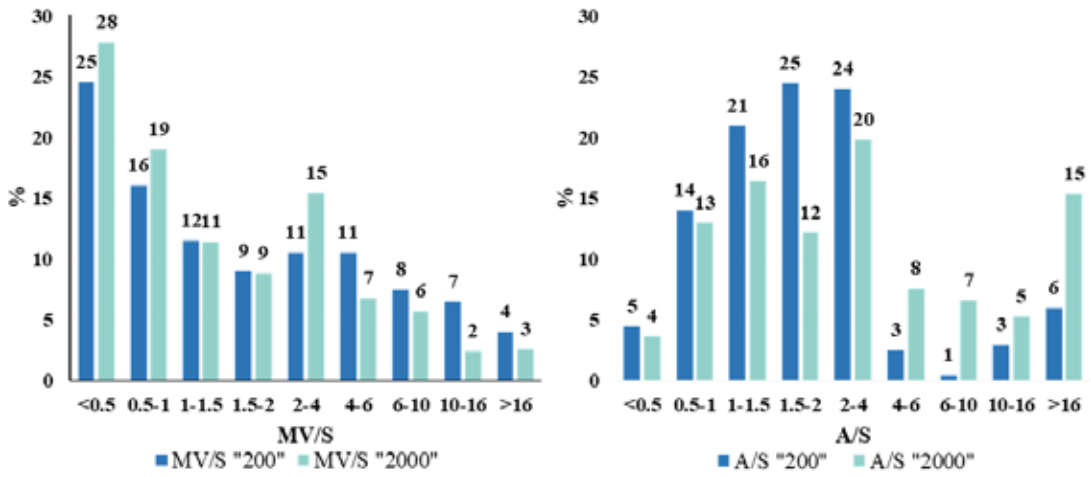

Fig. 3. **Representativeness of a sample of two hundred analyzed companies ("200") from the Forbes Global 2000 ("2000") list**

Source: compiled by the authors on the basis of Forbes Global 2000.

For this purpose, a detailed analysis of the impact of financial statements indicators (Balance Sheet, Statement of Financial Results, Statement of Cash Flows) for 2019 of two hundred domestic and foreign companies from the Forbes Global 2000 list on the ratio of their market value to sales was carried out.

The representativeness of the sample was assessed by the indicators Market Value/Sales and Assets/Sales (book value of assets to sales). The results of the percentage of the number of companies meeting a specific criterion of the total number in each of the two lists are shown in *Fig. 3*.

As an example, with MV/S and A/S indicators "<0.5", lists "200" and "2000", respectively, are represented by the following ratio of companies: MV/S — 25% and 28%; A/S — 5% and 4%.

Key items in the reports were decomposed and correlated with the organization's sales on an annualized basis for the purposes of comparison and elimination of economies of scale. The resulting 84 factors for assessing the organization's activities are grouped as a list sorted in descending order by the ratio of market value to the company's sales at the end of the reporting period.

Further, by comparing each factor with the utility coefficient (MV/S) of the organization, the correlation coefficient of the two variables is determined. The obtained dependencies were assessed from the point of view of the stable upward trend (positive correlation) or decline (negative correlation), as well as from the statistical significance of the correlation with a confidence level of 95%.

At the first stage of the analysis (*Fig. 4*), the ratio of the difference between the size of assets-liabilities to sales or Equity/Sales was compared with the ratio of the Market Value/Sales or utility coefficient (hereinafter — Utility), reflecting the assessment of the company's book value (hereinafter — Valuation) [24], and the difference in market value to sales with the valuation (MV/S — E/S), reflecting the investment attractiveness of the organization's activities (hereinafter — Interest).

The obtained dependencies make it possible to highlight in *Fig. 4* relevant intermediate values as criteria for segment formation:

- **T0 — T1 (MV/S ≈ 0.0–0.2)** — stability of Interest with an increase in the Valuation (Utility grows in proportion to the Valuation): the area of the critical financial condition of the asset (the market and book values of companies are close to zero);

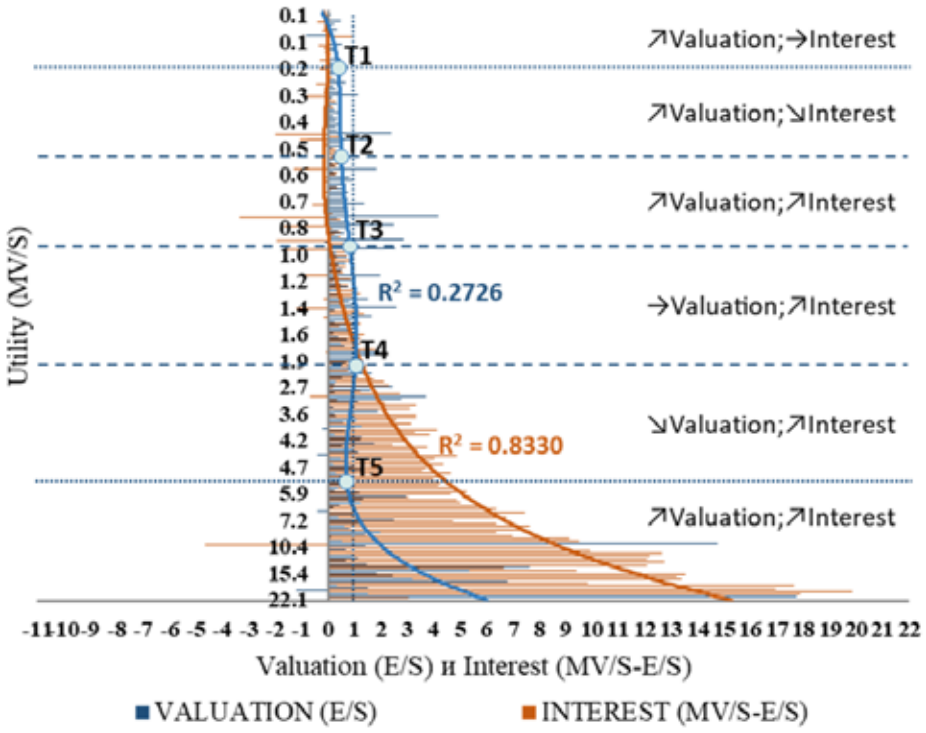

Fig. 4. **Dependence of Valuation and Interest of companies on the level of Utility**

Source: compiled by the author according to data from annual reports of companies.

- **T1 — T2 (MV/S ≈ 0.2–0.5)** — a decrease in Interest with an increase in Valuation (a smaller increase in Utility relative to Valuation): an area where the financial condition of the asset improves (the book value of companies exceeds the market value with an increase in the difference);
- **T2 — T3 (MV/S ≈ 0.5–1.0)** — an increase in Interest and Valuation (greater increase in Utility relative to Valuation): area of stabilization of the financial condition of the asset (the book value of companies exceeds the market value with a decrease in the difference);
- **T3 — T4 (MV/S ≈ 1.0–2.0)** — an increase in Interest and stability of the Assessment (Utility grows without a significant change in the Assessment): area of manifestation of the positive investment attractiveness of the asset (the market value of companies exceeds the book value with an increase in the difference, or Interest > 0,0);
- **T4 — T5 (MV/S ≈ 2.0–5.0)** — an increase in Interest with a decrease in Valuation (Utility increases with a decrease in Valuation): area of manifestation of the intangible component of the asset value (the market value of companies is more than twice the book value with an increase in the difference or Interest > Valuation);
- **T5 — T6 (MV/S ≈ 5.0–∞)** — an increase in Interest and Valuation (a greater increase in Utility relative to Valuation): the area where the potential of the asset value is realized (stabilization of the multiple difference between the market and book value of companies — the size of the equity capital of organizations changes almost in proportion to their capitalization).

If we arrange the values of these points on the market value-to-sales ratio diagram, including special cases (T0 and T6), then for clarity, they can form a circle with tangents to the abscissa axis at point T0 and to the ordinate at point T6 (*Fig. 5*). Points T2 and T4, in this case, coincide with the maxima of the values of the axes, and the line connecting the points T3 and the origin, located at an angle of 45° to the abscissa axis, divides the plane into two equal parts.

Using the resulting combination, divide the diagram into the appropriate segments:

- **Segment 1** — points T0 — T2;
- **Segment 2** — points T2 — T3;
- **Segment 3** — points T3 — T4;
- **Segment 4** — points T4 — T6.

The relationships between points T0 — T1 and T5 — T6 are taken as special cases of Segment 1 and Segment 4, respectively, since they only reflect the extreme degree of implementation of their criteria: the market value of companies is less than the book value without reducing the difference as Utility grows (T0 — T2); the market value of companies is more than twice the book value (T4 — T6).

According to the results of the analysis for each segment, the following average values of indicators were obtained:

- **Segment 1 (MV/S = 0.0–0.5)**: Valuation = = 0.31; Interest = –0.07;
- **Segment 2 (MV/S = 0.5–1.0)**: Valuation = = 0.89; Interest = –0.15;
- **Segment 3 (MV/S = 1.0–2.0)**: Valuation = = 0.78; Interest = +0.67;
- **Segment 4 (MV/S => 2.0)**: Valuation = = 1.68; Interest = +5.93.

It can be seen that Interest (MV/S — E/S) acquires a positive value in Segment 3, increasing multiple in Segment 4, and the E/S Valuation grows relatively intensively in Segments 1 and 4, having conditionally stable dynamics in Segments 2 and 3.

Point T0 is characterized by the presence of sales and the absence of the market value, which, taking into account the dynamics of the E/S ratio between T0 —T1 in *Fig. 4*, indicates the value of the company's book value tending to zero, i.e. current valuation of assets is close to total liabilities.

Point T5 expresses another extreme manifestation of the criteria of the Segmental Model — the absence of sales from an asset in the presence of its market value — this is an unrealized project, an idea that has an initial value.

On the basis of the conclusions, the shown

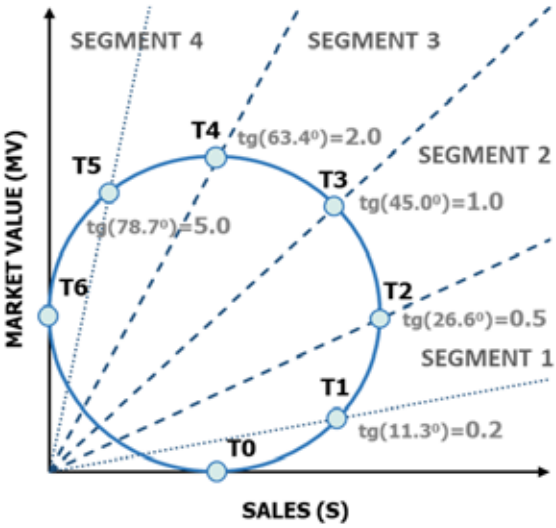

Fig. 5. **Parameters of forming model segments**

Source: compiled by the author.

in *Fig. 2* comparison of companies takes on its final form — *Segmental model for comparing the value of organizations (Fig. 6)*.

The highlighted segments, visually presented according to the key criterion of the model — the utility coefficient (MV/S), now characterize the creative profile, the specifics of the activities, and the financial well-being of companies in a specific period of their development. This allows us to more clearly correlate the assessment of the unit cost of an asset with industry competitors and the market as a whole, create a cognitive perception of the content of their essence.

FACTOR ANALYSIS

At the second stage of the analysis, in order to generalize the obtained dependencies, the factors calculated in an identical or similar way were grouped according to the following principles:

- **Profitability** — factors associated with the difference between sales and the aggregate of any kind of costs;
- **Cost** — factors related to the size (value) of any combination of cost types;
- **Provision** — factors related to the liquidity of assets, dynamics, movement

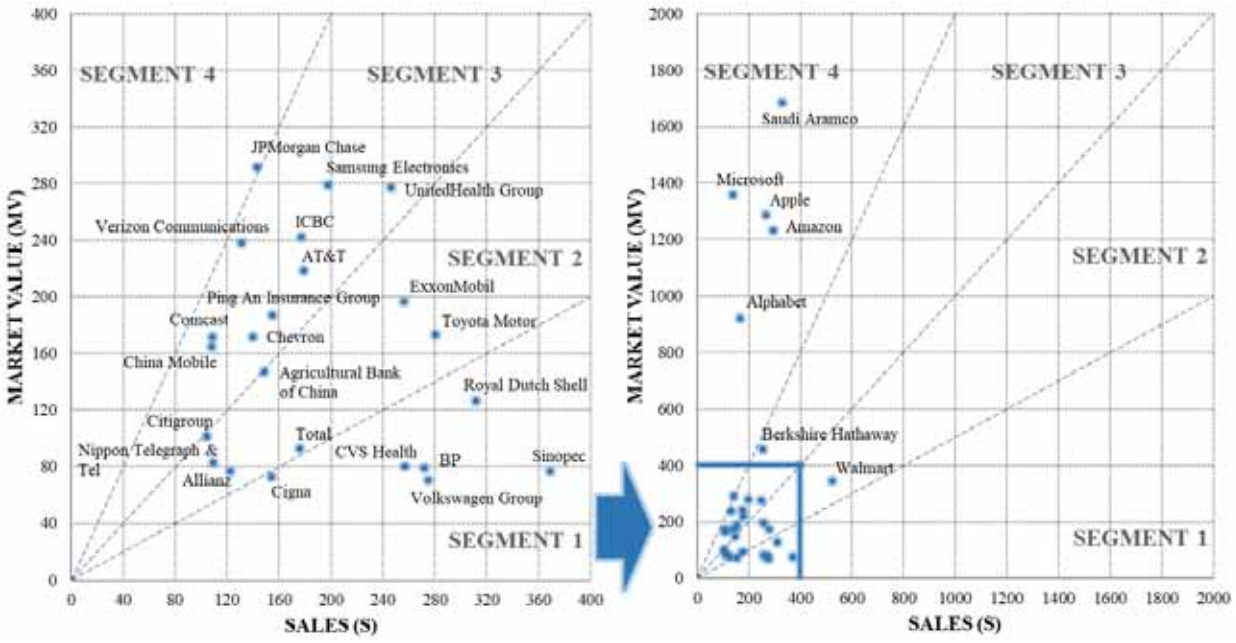

Fig. 6. **Segmental model for comparing selected companies, USD billion**

Source: compiled by the authors on the basis of Forbes Global 2000.

or availability of current assets (excluding inventory), non-current assets (excluding fixed assets), short-term and long-term liabilities, capital (excluding dividends), interest, free cash flow;

- **Capital** — factors related to the movement and availability of inventories and fixed assets, as well as the size of fixed assets acquired and the level of depreciation;
- **Intensity** — factors related to return on assets, investments and capital, turnover of assets in general, current assets, cash, fixed assets, and inventory;
- **Dynamicity** — factors related to the dynamics of operating profit, the size and dynamics of dividends.

The calculation results, common for the entire sample and separately for each segment for the eight factors most affecting the ratio of the market value to sales (correlated with sales), indicating the name of their group, are presented in the form of a sorted list in descending order of the magnitude of the correlation (*Table 2*).

The boundary indicator of the significance of the correlation coefficient at a confidence level of 95% of the analyzed sample of organizations within the framework of the analysis was 0.1388 modulo.

Without considering the criterion of a very weak interdependence of variables, in further study, we used indicators of factors with a correlation coefficient value of more than 0.20 in modulus.

Since a certain combination of assessment factors is a close or identical calculation method, it is advisable to use the value of their specific weight to determine the degree of influence of their groups on the utility coefficient (MV/S).

For this purpose, the specific value of the approximation reliability (the square of the correlation coefficient — the coefficient of determination) was calculated as follows for each group of factors in the context of segments and for the sample as a whole (*Table 3*):

- total correlation coefficient ($\Sigma R_{0,20}$) is the total of the correlation coefficients of a group of factors with a modulus value exceeding 0.20;
- the average correlation coefficient (R_{cp}) is the ratio of the total correlation coefficient ($\Sigma R_{0,20}$) of the group to the number of factors involved in its calculation;

Table 2

Correlation of factors for assessing the financial performance of companies with a utility ratio (MV/S)

SAMPLE	Assessment factor	Factor group	Corr. coef.
TOTAL	Cost (including depreciation and other operating expenses)	Cost	–0.7024
	Net profit	Profitability	0.6555
	EBT	Profitability	0.6453
	Operating income –Taxes – (Value of long-term liabilities × Long-term liabilities)	Profitability	0.5967
	Operating expenses + Tax	Cost	–0.5681
	(Sales – Operating expenses) × Dynamics of operating profit	Dynamicity	0.4864
	ROA	Intensity	0.4859
	Capital	Provision	0.4834
SEGMENT 4	Cost (including depreciation and other operating expenses)	Cost	–0.5683
	(Net profit – Other income / expenses (not operating) – Revaluation and extraordinary items) – (Value of long-term liabilities × Long-term liabilities)	Profitability	0.5462
	Net profit	Profitability	0.5395
	EBT	Profitability	0.5313
	Net profit – Other income / expenses (not operating) – Revaluation and extraordinary items	Profitability	0.5161
	NOPAT	Profitability	0.4927
	EBIT	Profitability	0.4874
	Operating income – Taxes – (Value of long-term liabilities × Long-term liabilities)	Profitability	0.4817
SEGMENT 3	Financial investments and Bills / Assets	Provision	–0.3332
	Short-term liabilities / Assets	Provision	–0.3075
	(Current Assets – Inventories – Current Liabilities + Changes in Working Capital) / Assets	Provision	0.2659
	Operating expenses + Tax	Cost	–0.2550
	Interest received (paid)	Provision	–0.2479
	(Current assets – Cash – Inventories) / Fixed assets	Provision	0.2318
	Other income / expenses (not operating)	Cost	–0.2280
	Free Cash Flow	Provision	0.2270
SEGMENT 2	SOA Asset Turnover (Sales / Assets)	Intensity	–0.5464
	(Fixed assets – Depreciation) / Assets	Capital	–0.4771
	Fixed assets / Assets	Capital	–0.4371
	Turnover of current assets (Sales / Current assets)	Intensity	–0.4366
	ROIC	Intensity	–0.4322
	ROI	Intensity	–0.4209
	Long-term liabilities / Assets	Provision	0.4137
	ROA	Intensity	–0.4130
SEGMENT 1	ROA	Intensity	0.4816
	Dividend	Dynamicity	0.4414
	ROI	Intensity	0.4340
	(Sales – Operating expenses) × Dynamics of operating profit	Dynamicity	0.4137
	Operating expenses + Tax	Cost	–0.4076
	EBT	Profitability	0.3797
	Operating income – Taxes – (Value of long-term liabilities × Long-term liabilities)	Profitability	0.3690
	Retained earnings	Provision	0.3316

Source: compiled by the author according to data from annual reports of companies.

Table 3

The results of calculating the specific reliability of the approximation (R_{av}^2, %) using correlation coefficients greater than 0.20 modulo

GROUP	R_{av}^2, % / R_{av}^2, %					Number of factors in calculation				
	Seg. 1	Seg. 2	Seg. 3	Seg. 4	TOTAL	Seg. 1	Seg. 2	Seg. 3	Seg. 4	TOTAL
Profitability	14.44	13.96	0.00	**26.71**	**21.79**	6	11	0	**10**	**6**
Cost	15.29	18.01	**50.27**	17.60	**24.71**	4	6	**2**	4	**4**
Provision	12.59	15.09	**49.73**	12.27	13.26	18	20	**11**	12	11
Capital	12.81	**15.29**	0.00	9.97	10.28	1	**8**	0	4	4
Intensity	**19.84**	**22.34**	0.00	7.68	16.04	8	**9**	0	6	4
Dynamicity	**25.04**	15.31	0.00	**25.77**	13.92	**3**	2	0	**1**	2
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**40**	**56**	**13**	**37**	**31**

Source: compiled by the author according to data from annual reports of companies.

- reliability of approximation (R_{cp}^2) is the square of the average correlation coefficient (determination coefficient);
- the specific value of the accuracy of approximation (R_{cp}^2,%) is the percentage of the value of the reliability of the approximation (R_{cp}^2) of a particular group to the total of the same indicator for all groups.

An example of calculation for the "Profitability" group within the general sample (generalized for all segments):

- total correlation coefficients of assessment factors with a modulus value of more than 0.20 ($\Sigma R_{0,20}$) is 2.7621;
- the average correlation coefficient (R_{cp}) = = $\Sigma R_{0,20}$ / the number of factors involved in its calculation is, respectively: 2.7621 / 6 = 0.46;
- the reliability of approximation (R_{cp}^2): $0.46^2 = 0.21$;
- the specific value of approximation reliability (R_{cp}^2,%) = (R_{cp}^2) / total R_{cp}^2 of all groups × 100: 0.21 / 0.97 × 100 = 21.79%.

As a result, attention is drawn to the heterogeneity of the distribution of the proportion of groups of factors in relation to the company's costs to sales. If for the general sample the results are predictable — more expensive companies have higher profitability and, accordingly, lower operating costs, then when considered within the Segmental Model, different groups of factors manifest themselves in different ways.

The right side of the *Table 3* shows the range from 0 to 20 values of the number of assessment factors involved in calculating the specific reliability of the approximation of groups. Considering the conditional identity of the algorithms for calculating individual indicators, such a multiple difference can distort the results of the assessment.

To make the conclusions more convincing, we make a comparison in the form of two-factor (*Table 4*) and one-factor (*Table 5*) methods for calculating the total correlation coefficient of groups, which are supposed to use, respectively, two and one factors from each group, with the highest values of the correlation coefficient in modulus, regardless of the significance of the indicator.

In this case, there is a certain pattern of the results obtained, in particular for Segment 1 (Intensity and Dynamicity), Segment 2 (Capital and Intensity), Segment 3 (Cost and Probability) and for the sample as a whole (Profitability and Cost), the key factors affecting the utility coefficient (MV/S) groups are identical and close to the calculation method with the value of correlation coefficients more than 0.20 modulo.

Table 4

The results of calculating the specific reliability of the approximation (R_{av}^2, %) by two-factor method

GROUP	R_{av}^2, % / R_{av}^2, %				
	Seg. 1	Seg. 2	Seg. 3	Seg. 4	TOTAL
Profitability	17.66	11.60	6.12	**28.46**	**27.59**
Cost	13.77	14.51	**22.77**	25.53	26.32
Provision	13.04	16.61	**40.06**	18.40	15.17
Capital	6.07	**21.77**	10.61	9.38	8.36
Intensity	**26.41**	**25.18**	10.35	8.16	13.74
Dynamicity	**23.04**	10.33	10.09	10.07	8.83
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: compiled by the author according to data from annual reports of companies.

Table 5

The results of calculating the specific reliability of the approximation (R_{av}^2, %) by one-factor method

GROUP	R_{av}^2, % / R_{av}^2, %				
	Seg. 1	Seg. 2	Seg. 3	Seg. 4	TOTAL
Profitability (Net profit)	8.97	7.86	12.54	**25.59**	**25.14**
Cost [Cost ((including depreciation and other operating expenses)]	10.35	2.36	**23.51**	**28.39**	**28.87**
Provision (Capital)	15.65	15.25	**35.94**	17.47	13.67
Capital (Fixed Assets / Assets)	0.09	**29.40**	10.31	5.76	4.66
Intensity [Return on assets (ROA)]	**37.36**	**26.25**	0.46	4.65	13.82
Dynamicity ((Sales — Operating expenses) × Dynamics of operating profit)	**27.57**	18.87	17.24	18.14	13.84
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: compiled by the author according to data from annual reports of companies.

The groups of factors with the highest specific value of the approximation reliability for Segment 4 in the calculation method with the value of the correlation coefficients in modulus more than 0.20 differ from the two-factor and one-factor calculation methods. In the first case, the "Dynamicity" group, represented by one factor participating in the calculation, exceeds the indicator of the "Cost" group, represented by 4 factors, by 8.17 percentage points, but according to the one-factor method, it is less by 10.25 percentage points, which is correct for comparison purposes (one factor — to one factor).

Thus, summarizing the specifics of companies from different sectors according to *Fig. 4* and *6*, as well as the main criteria for increasing the utility coefficient (MV/S) according to *Table 2–5*, a short description of each segment will be given.

Segment 1 (MV/S < 0.5) — the sector of crisis or financially supported companies:

- the market value does not exceed the book value, which, in turn, is less than half of the annual sales;
- the growth of the utility coefficient is mainly associated with:

– with an *increase* in the return on assets, investments, and capital, the dynamics of

operating profit, the size, and dynamics of dividends;

– with a *decrease* in the turnover of assets, including current assets, cash, fixed assets and inventories.

Segment 2 (0.5 <= MV/S < 1.0) — sector of manufacturing (processing and extracting raw materials) companies:

• the market value does not exceed the book value (which tends to the level of annual sales), with the difference decreasing as the MV/S ratio increases within the segment;

• the growth of the utility coefficient is mainly associated [25–28]:

– with an *increase* in the level of renewal of fixed assets, return on assets, investments, and capital;

– with a *decrease* in the size of inventories and fixed assets, asset turnover, including current assets, cash, fixed assets, and inventories.

Segment 3 (1.0 <= MV/S < 2.0) — the sector of trading (network) companies:

• the market value exceeds the book value, which is close to the level of annual sales within the segment;

• the growth of the utility coefficient is mainly associated with:

– with an *increase* in the liquidity of assets, free cash flow and the share in the balance sheet structure: current assets (excluding inventory), non-current assets (excluding fixed assets), long-term liabilities, capital (excluding dividends);

– with a *decrease* in the size (level) of any combination of types of costs, short-term liabilities, investments and interest received in the balance sheet structure.

Segment 4 (MV/S >= 2.0) — the sector of innovative companies:

• the market value is more than twice the book value, which is higher than the level of annual sales within the segment;

• the growth of the utility coefficient is mainly associated with:

– with an *increase* in the difference between revenue and the aggregate of any type of costs;

– with a *decrease* in the size (level) of any combination of cost types.

FACTOR COMPARISON OF ORGANIZATIONS

Considering various priorities of organizations in terms of their development, to assess their current state and compare with other market participants, we will use the results of the factor analysis of companies' activities, according to *Table. 2* determining the conditions for increasing the utility coefficient depending on the segment of the ratio of the market value to sales.

If companies in terms of MV/S have similar values (within the same segment or in its boundary values), it is advisable to correlate them by factors for a particular segment, if the difference is significant, the assessment should be carried out in the table of the general sample.

As an example, we compare Apple, Alphabet, and Berkshire Hathaway from *Table 1* for 12 key factors, distinguished by the most characteristic features of the inconsistency of indicators (*Table 6*).

At first glance, Berkshire Hathaway has large net income, assets, and sales comparable to Apple and Alphabet, which also demonstrates a higher Profits/Sales ratio. However, it is half the price of Alphabet and three times the price of Apple.

Berkshire Hathaway's profits are associated with major factors that exceed those of comparable companies, with most of the rest being worse.

The largest bias in the factors justifying Berkshire Hathaway's lower utility relative to Apple and Alphabet is associated with relatively high production costs and operating expenses, less free cash and its ratio to asset size, lower return on assets (ROA) and investment (ROI), smaller equity capital (all indicators are relative to sales).

In total, out of 31 factors assessing the general comparison (for all segments), having

Table 6

Factorial comparison of Apple, Alphabet, and Berkshire Hathaway within the total sample

No.	Assessment factor	Factor group	Corr. coef.	Apple	Alphabet	Berkshire Hathaway
1	Cost (including depreciation and other operating expenses)	Cost	–0.7024	0.62	0.45	0.81
2	Net profit	Profitability	0.6555	0.21	0.21	0.32
3	EBT	Profitability	0.6453	0.25	0.24	0.40
4	Operating income – Taxes – (Value of long-term liabilities × Long-term liabilities)	Profitability	0.5967	0.19	0.18	0.02
5	Operating expenses + Tax	Cost	–0.5681	0.79	0.82	0.97
6	(Sales – Operating expenses) × × Dynamics of operating profit	Dynamicity	0.4864	0.23	0.20	0.11
7	ROA	Intensity	0.4859	0.17	0.12	0.10
8	Equity	Provision	0.4834	0.30	1.24	1.67
9	Cash / Assets	Provision	0.4811	0.29	0.43	0.08
10	Urgent liquidity ((Current assets – Inventories) / Short-term liabilities)	Provision	0.4773	1.46	3.44	1.50
11	Equity – Retained earnings	Provision	0.4372	0.17	0.30	0.09
12	ROI	Intensity	0.4320	0.25	0.15	0.11

Source: compiled by the author according to data from annual reports of companies.

a correlation coefficient of more than 0.20 in modulus, for 16 of them Berkshire Hathaway has values inferior to Apple and Alphabet, in 6 factors — exceeding and in 9 factors — intermediate.

Since Berkshire Hathaway's utility has a marginal value between Segment 3 and Segment 4, a similar analysis can be made by comparing the factors in Segment 4. The result is similar since its key criteria are identical to the total sample.

CONCLUSIONS

As a rule, the life cycle of a company's development is represented by one or two, less often three segments. The transition between segments requires a significant change in the structure of the organization's balance sheet and other indicators of financial statements, which in market conditions implies significant changes in the business model or its complete change.

Accordingly, the focus solely on profits and costs as key conditions for increasing the value of an organization, in this case, is justified only in Segment 4. For other sectors, other factors should be taken into account, sometimes with a large dominant value.

Based on this, each segment can be represented as a level of creative activity of companies, while the transition to the next of them within the market as a whole is carried out by releasing the capabilities of the previous ones, complementing them (not replacing them), relying on them as an increase in the size of the structure, the stability of which is determined by the uniform distribution of the load [29]. That is, the need to increase the average market utility, primarily by increasing profitability, should be decomposed into components in relation to individual segments of the model. They prioritize different groups of factors, which together create a single picture of goals.

With the obvious social utility for the market as a whole, an increase in the ratio of companies' market value to sales as an indicator of economic development, consumer and business activity of its participants, the implementation of this goal requires a revision of an unambiguous judgment about maximizing profit as the main goal of the business. The profitability and level of costs of firms in the lower segments of the model should stimulate the development of organizations in the upper segments, considering the use of targeted instruments that take into account the characteristics and specifics of their type of activity. [30]. Moreover, the lower the segment of the company's location, the greater the synergistic effect this circumstance will have.

The implementation of the Segmental Model implies that, in addition to the actual evolution in the form of a stage of the life cycle (beginning, growth, stagnation, decline, completion) and size (assessment of the occupied market share), the key characteristic of the company's activities is the segment of its public utility, which is a conditionally constant entity formed a unique internal culture associated with the characteristics of birth (a type of activity) and existence (competitive environment) [31].

The correlations of various indicators and multipliers of the financial statements of organizations obtained in the course of the analysis in relation to their current and calculated ratio of capitalization from proceeds allow us to assess the value of companies, to compare the dynamics of their activities with industry competitors and the market as a whole for a selected period of time, and to define directions for increasing utility coefficient.

REFERENCES

1. Dreving S.R., Khrustova L.E. Non-financial factors of value formation in the financial control system of the holding development strategy. *Finansy: teoriya i praktika = Finance: Theory and Practice.* 2018;22(6):53–68. (In Russ.). DOI: 10.26794/2587–5671–2018–22–6–53–68
2. Mezhov I.S., Dronova O.B. National corporate governance model: The imperatives of funding the growth of the Russian economy. *Finansy: teoriya i praktika = Finance: Theory and Practice.* 2018;22(3):36–51. (In Russ.). DOI: 10.26794/2587–5671–2018–22–3–36–51
3. Modigliani F., Miller M.H. The cost of capital, corporation finance, and the theory of investment. *The American Economic Review.* 1958;48(3):261–297.
4. Modigliani F., Miller M.H. Corporate income taxes and the cost of capital: A correction. *The American Economic Review.* 1963;53(3):433–443.
5. Miller M. The Modigliani-Miller propositions after thirty years. *The Journal of Economic Perspectives.* 1988;2(4):99–120. DOI: 10.1257/jep.2.4.99

6. Limitovskii M.A., Lobanova E.N., Palamarchuk V.P. Financial management as the sphere of applied use of corporate finance. Moscow: Higher School of Finance and Management; 2011. 392 p. URL: http://www.shfm.ranepa.ru/sites/default/files/books/limitov_part1.pdf (accessed on 29.11.2020). (In Russ).
7. Rutgaizer V.M., Antill N., Lee K. Company valuation under IFRS: Interpreting and forecasting accounts using International Financial Reporting Standards. 2nd ed. *Voprosy ekonomiki.* 2011;(7):149–152. (In Russ.). DOI: 10.32609/0042–8736–2011–7–149–152
8. Volkova N.A. The model estimating the level of efficiency of corporate governance. *Statistika i ekonomika = Statistics and Economics.* 2018;15(2):49–58. (In Russ.). DOI: 10.21686/2500–3925–2018–2–49–58
9. Evans D.S. The relationship between firm growth, size, and age: Estimates for 100 manufacturing industries. *The Journal of Industrial Economics.* 1987;35(4):567–581. DOI: 10.2307/2098588
10. Heshmati A. On the growth of micro and small firms: Evidence from Sweden. *Small Business Economics*. 2001;17(3):213–228. DOI: 10.1023/A:1011886128912
11. Morone P., Testa G. Firms' growth, size and innovation: An investigation into the Italian manufacturing sector. *Economics of Innovation and New Technology*. 2008;17(4):311–329. DOI: 10.1080/10438590701231160
12. Singh A., Whittington G. The size and growth of firms. *The Review of Economic Studies*. 1975;42(1):15–26. DOI: 10/2307/2296816
13. Varaiya N., Kerin R.A., Weeks D. The relationship between growth, profitability, and firm value. *Strategic Management Journal*. 1987;8(5):487–497. DOI: 10.1002/smj.4250080507
14. Ivashkovskaya I.V., Zhivotova E.L. Sustainable growth index: Empirical testing using data from Russian companies. *Vestnik Sankt-Peterburgskogo universiteta. Menedzhment = Vestnik of Saint Petersburg University. Management Series.* 2009;(4):3–29. (In Russ.).
15. Hall B.H. The relationship between firm size and firm growth in the US manufacturing sector. *The Journal of Industrial Economics*. 1987;35(4):583–606. DOI: 10.2307/2098589
16. Geroski P., Gugler K. Corporate growth convergence in Europe. *Oxford Economic Papers*. 2004;56(4):597–620. DOI: 10.1093/oep/gpf055/
17. Sheremet A.D. A complex analysis of sustainable development indicators of an enterprise. *Ekonomicheskii analiz: teoriya i praktika = Economic Analysis: Theory and Practice*. 2014;(45):2–10. (In Russ.).
18. Ryabova E.V., Samodelkina M.A. Factors of sustainable growth of Russian companies. *Finansy: teoriya i praktika = Finance: Theory and Practice.* 2018;22(1):104–117. (In Russ.). DOI: 10.26794/2587–5671–2018–22–1–104–117
19. Ararat M., Black B.S., Yurtoglu B.B. The effect of corporate governance on firm value and profitability: Time-series evidence from Turkey. *Emerging Markets Review*. 2017;30:113–132. DOI: 10.1016/j.ememar.2016.10.001
20. García-Madariaga J., Rodríguez-Rivera F. Corporate social responsibility, customer satisfaction, corporate reputation, and firms' market value: Evidence from the automobile industry. *Spanish Journal of Marketing — ESIC*. 2017;21(Suppl. 1):39–53. DOI: 10.1016/j.sjme.2017.05.003
21. Belo F., Lin X., Vitorino M.A. Brand capital and firm value. *Review of Economic Dynamics*. 2014;17(1):150–169. DOI: 10.1016/j.red.2013.05.001
22. Altman E.I. Measuring corporate bond mortality and performance. *The Journal of Finance.* 1989;44(4):909–922. DOI: 10.1111/j.1540–6261.1989.tb02630.x
23. Nikulin E.D., Sviridov A.A. Earnings management by Russian companies at the initial public offering. *Finansy: teoriya i praktika = Finance: Theory and Practice.* 2019;23(1):147–164. (In Russ.). DOI: 10.26794/2587–5671–2019–23–1–147–164
24. Volkov D.L., Nikulin E.D. Working capital management: Analysis of the impact of the financial cycle on the profitability and liquidity of companies. *Vestnik Sankt-Peterburgskogo universiteta. Menedzhment = Vestnik of Saint Petersburg University. Management Series*. 2012;(2):3–32. (In Russ.).
25. Lanza A., Manera M., Grasso M., Giovannini M. Long-run models of oil stock prices. *Environmental Modelling & Software*. 2005;20(11):1423–1430. DOI: 10.1016/j.envsoft.2004.09.022

26. Bhaskaran R.K., Sukumaran S.K. An empirical study on the valuation of oil companies. *OPEC Energy Review*. 2016;40(1):91–108. DOI: 10.1111/opec.12064
27. MacDiarmid J., Tholana T., Musingwini C. Analysis of key value drivers for major mining companies for the period 2006–2015. *Resources Policy*. 2018;56:16–30. DOI: 10.1016/j.resourpol.2017.09.008
28. Osmundsen P., Asche F., Misund B., Mohn K. Valuation of international oil companies. *The Energy Journal*. 2006;27(3):49–64. DOI: 10.2307/23296990
29. Dosi G. Economic coordination and dynamics: Some elements of an alternative "evolutionary" paradigm. *Voprosy ekonomiki*. 2012;(12):31–60. (In Russ.).
30. Polterovich V.M. On the strategy of catching-up development for Russia. *Ekonomicheskaya nauka sovremennoi Rossii = Economics of Contemporary Russia*. 2007;(3):17–23. (In Russ.).
31. Kochetkova A.I. Introduction to organizational behavior and organizational modeling. Moscow: Delo; 2011. 944 p. (In Russ.).

ABOUT THE AUTHOR

Dmitrii N. Belykh — Master's student, Department of Management, Institute of Business Studies, The Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia
bdn@inbox.ru

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Prospects for the Development of the Banking Sector of Azerbaijan

Y.F. Veliyeva
Azerbaijan State University of Economics, Baku, Azerbaijan
https://orcid.org/0000-0002-9758-9469

ABSTRACT

The **relevance** of the problem of the banking sector development lies in the fact that banks, implementing their economic policy, can ensure continuous sustainable growth of the entire national economy. The study **aims** to offer long-term proposals for the development of the banking sector of Azerbaijan, which will bring it to the next level. During the research the author used such **methods** as the study of literary sources, analysis, synthesis, abstraction and special methods. The study presents six major macroeconomic factors that significantly affect the rate of the long-term growth of the banking sector: customer focus, legal framework, new banking technologies, cyber threats, use of the experience of large IT companies, and qualified personnel. The author analyzed the effects of these factors on the long-term growth rate. Recommendations are given on the use of innovation and advanced technologies for the benefit of development, that will allow building an efficient and competitive banking system. Based on the results of the study, the author formulated proposals for improving the banking sector of Azerbaijan that will bring it to the next level. In particular, it is proposed to optimize robotic process automation, namely, to completely revise the existing methods of work, and not just solve problems using robotization. The author **concluded** that there is a long way ahead towards ensuring the sustainable development of the banking sector in Azerbaijan, which is currently at the beginning of its journey. Further research on this topic will allow a deeper study of digital opportunities and prospects for the integrated implementation of innovation.

Keywords: bank; banking system of Azerbaijan; banking sector, innovation; robotization; technologies; customer focus

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INTRODUCTION

The banks, which form the backbone of the country's financial system, act as intermediaries to ensure that savings are taken from those with surplus funds and transferred to public or private institutions with deficits. The transfer of the provided resources to production and profitable areas has a positive effect on the country's economy and adds dynamism to economic development. As in any country, economic, social and political changes affect the characteristics, structure and orientation of the banking sector in our country. The banking sector is expected to continuously evolve to diversify its economic activities, taking into account the effects of globalization and, as a result, to meet the growing funding needs. The banking sector, which is of great importance for the healthy operation of the economy of the country, has become one of the sectors, which responses sensitively to changes in the national economy.

In this context, the crises that have occurred in the country have affected the entire economy and had very negative consequences for the fragile and uncertain structure of the Azerbaijani banking system. As a result of this negative sector, liquidations and mergers took place and new sector-specific regulations were introduced. The banking sector performance affects all economic units in the country. Thus, it is important to measure and control the performance of the banking sector.

THE BODY OF THE ARTICLE

Starting from 2018, in banking, it has become relevant to solve a variety of problems that are related to the settlement, the process of updating outdated systems, the introduction of advanced technologies and business models, an increase in competitiveness and customer expectations,

taking into account the provision, in this case, the implementation of a new sustainable development strategy. Banks that are able to seize new opportunities will have a chance to gain an advantage and thus be able to balance long-term goals and short-term performance requirements. The next period will be crucial for the banking system in accelerating their transformation into more strategically oriented and technologically advanced financial institutions with flexible operating structures to maintain leadership in a rapidly changing business environment. This transformation is challenging as most banks face a number of hurdles, such as complex and conflicting regulatory requirements, computer systems becoming obsolete, new technologies evolving, new business models emerging, competition intensifying, and customer demands and expectations constantly increasing.

For this purpose, 6 major factors were identified, which to a large extent affect the rate of long-term growth in the banking system:

1. The need, as a result of any changes, to maintain the principle of customer focus;

2. Relevant changes in the legal framework in accordance with the measures taken;

3. Rational management of technologies to achieve efficiency in banking;

4. Reducing the level of cyber risks to ensure the security and independence of the process;

5. Development of fintech projects and use of the experience of large IT companies;

6. Revision of labor resources in favor of more qualified personnel.

As a result, banks will have to implement the business transformations necessary to ensure the sustainability of their companies along with their operational challenges. Banks need to find the right balance between long-term goals and today's needs. And those who manage to achieve such a balance will gain significant superiority.

Let's consider each of the six factors in more detail.

1. The need, as a result of any changes, to maintain the principle of customer focus.

Long-term sustainable development in banking is only possible if there is a fundamental shift from a product-centered and sales-centered approach to a customer-centered approach, and then refining strategies that target relevant markets, customer segments and solutions.

Although the banking industry has changed in many ways over the past few years, most organizations here, unlike other areas, have not redefined their business processes towards customer focus. As digital innovation evolves, banks run the risk of missing out on customer satisfaction monitoring.

After the liquidation and consolidation of a number of banks in Azerbaijan, the remaining banks were constrained to re-examine their showcase techniques and procedures for working with clients. In numerous cases, such choices were driven by administrative necessities instead of an improved understanding of desires of markets and clients. Opposite to desires, not all banks pay consideration to client fulfillment.

Fortunately, there are banks that are starting to realize that the improvement of already seen danger to the fintech industry opens up favorable prospects for client benefit by leveraging the involvement of fintech companies and organizing participation with them.

Fintech companies have appeared that they can meet all of their necessities and surpass desires through remarkable client care.

However, the presentation of unused innovation, as a run the show, made a difference to unravel existing issues to some extent. The biggest challenge for most banks is to attain organizational adaptability. To do this, they must improve, change the way individuals oversee and construct vital organizations to create choices that advantage clients over the broader environment of members.

2. Relevant changes in the legal framework in accordance with the measures taken.

Expectations of a significant relaxation of regulation may not be justified. Compliance desires, particularly with respect to reasonable treatment of clients and senior administration responsibility, will stay high. In addition, controllers are anticipated to proceed to actualize requirement observing programs and require more divulgences from banks to test the operational judgment of complex organizations, especially in times of stress.

For banks to achieve operational modernization, it is necessary to integrate compliance objectives in

terms of control and responsibility with the bank's vital destinations, counting advancement, operational re-arrangements, chance administration and fetched optimization. In other words, the compliance system must be consistent with the bank's business strategy. Failure to do so could put banks at risk of regulatory breaches and reduced productivity.

Banks should also pay particular attention to regulatory compliance when identifying and managing required changes, both at the individual business unit and corporate level. These changes will require managers to consistently apply standards of due diligence in managing their operations. Regulators are also placing increased demands on senior management accountability.

3. Rational management of technologies to achieve efficiency in banking.

To increase the agility of their organizations, bank CIOs must develop areas within their portfolio of technology assets that provide the bank with a real competitive advantage. Ancillary activities should be outsourced cost-effectively.

Most banks confront the challenges of overseeing innovation assets, which are a mess of frameworks, stages, computer programs and apparatuses, numerous of which are obsolete and require critical assets and capital to keep them running easily. In this respect, updating the center working framework is getting to be a self-evident need for banks. According to ICT Enterprise Insights, conducted by analyst firm Ovum in 2016, nearly 25 percent of the banking sector surveyed worldwide cited modernization as the most important IT trend.[1]

To implement vital changes in their banks and increment effectiveness with negligible disruption to inside frameworks, CIOs ought to guarantee the compatibility of unused innovation arrangements from diverse outside providers. This, in turn, may require a significant increase of the IT budget in banks.

However, money alone is usually not enough. In their quest for simplification, modernization and flexibility of systems, banks must ask themselves three important questions:

1. How will they manage their portfolio of technology assets to maximize business performance?

2. How will the specified level and sort of technology outsourcing be decided (locks in third parties to plan, create and oversee innovation arrangements)?

3. How will they focus resources exclusively on developing those activities that provide a competitive advantage?

The growth in the number of technology platforms and technology developers in the market, as well as the development of cloud solutions, have made outsourcing more convenient and affordable. Of course, this practice is not new for banks, but often in order to maintain competitive advantages in the market, it becomes necessary to significantly expand the scope of outsourced functions. Bank technology groups can play a key role in managing the new outsourcing model and maximizing business value.

Of course, outsourcing is not applicable to all core activities — technical support for some activities, for example, in the area of compliance and risk management, should be provided by the internal divisions of the bank.

One example of outsourcing is mission-critical managed services that require specialized technical staff but provide the company with a limited competitive advantage [1]. In addition, external service providers can automate compliance processes, which saves labor — the bank staff only needs to complete the final stage of analysis and prepare reports for regulators.

An outsourcing strategy typically requires a more careful approach to technology developer selection, with a focus on high-quality software and in-depth banking knowledge (such as servicing mortgages or handling demand deposits).

Multifunctional organizations prefer to use "star" models that include numerous connections with third parties in several ranges. They are rebuilding their strategies of contracting with providers and overseeing and directing their exercises appropriately.

Outsourcing can moreover play a basic part in modernizing applications — through optimization, rebuilding, code modifying, or porting to another stage, as well as the capacity to move the stage to the cloud.

[1] 2016 Ovum ICT Enterprise Insights Survey. URL: https://www2.deloitte.com/kz/ru/pages/financial-services/articles/gx-banking-industry-outlook.html (accessed on 12.12.2020).

4. Reducing the level of cyber risks in order to ensure the security and independence of the process.

Increased interdependence among the participants in the banking ecosystem, accelerated introduction of new technologies and continued dependence on obsolete infrastructure — all these factors contribute to the growth of cyber risks.

Cybersecurity is recognized globally — cyber risk is a priority on the agenda of financial risk managers [2]. Acting ahead of ever-changing business needs and addressing increasingly sophisticated threats from attackers is a top priority for bank executives [2].

This is confirmed by the methods of cyber risk management used by many banks now. Many banks employ qualified cybersecurity professionals in their cybersecurity divisions.

However, cyber risk is becoming more complex, and the impact of such risk is often not fully understood and cannot be accurately determined. Thus, there is still much work to be done by banks to implement mechanisms to proactively monitor cyber risks in their operations on a progressing premise. It begins by building a solid culture of due tirelessness all through the organization and understanding cybersecurity as a key factor in creating trade forms, techniques and imaginative arrangements.

As the transformations taking place in many banks are largely driven by technological advances, banks need to analyze and manage cyber risks in all aspects of the changes taking place — whether it is modernizing legacy systems or introducing new technologies. Banks have numerous benefits from paying close attention to cyber risk and understanding its importance in almost all aspects of their business. This approach allows companies to shorten the time it takes to enter new markets, increase their resilience and meet market demands, which is what is meant by organizational flexibility. In short, in order to increase organizational flexibility and efficiency, banks should consider cyber risk as a primary factor in their decision making.

5. Development of fintech projects and use of the experience of large IT companies.

Customer-centric fintech companies remain at the forefront of banking innovation. In this circumstance, banks have a few technique choices. They can begin rehashing the activities of fintech companies, make comparative imaginative arrangements, connected with them (whereas losing their competitive advantage), or follow a coordinated methodology based on their capabilities and showcase position.

In spite of the reality that fintech companies have found their specialty within the managing an account division, numerous will concur that they "have not been able to drastically change the conditions of competition" [3]. Clearly, it is as well early to say that fintech companies and other non-banking organizations will permit buyers to totally desert mediators. Huge legacy players are likely to preserve their showcase administration due to the taking after three components that proceed to work for them:

1) administrative limitations anticipating section to the market;

2) customers' normal hesitance to alter something;

3) the accessibility of adequate capital to secure, build up participation or duplicate the victory of fintech companies.

However, it ought to be recognized that inventive arrangements made by fintech companies take client benefit to a modern level [3]. But this improvement in fintech organizations and other non-banking companies within the money holding division is most likely indicative of a change in the money holding system itself.

Banks, using the experience of fintech companies, will be able to revise their competitive strategies. As fintech and other non-traditional banking providers embrace different areas of banking (lending, payments, stock trading, high net worth, etc.), traditional banks must compare themselves to what they perceive to be the best at its segment in terms of features and solutions. This broad view of the competition will allow them to become more resilient to future threats.

Banks can develop a more differentiated approach to working with fintech companies, considering their impact on each business function separately (including operations, finance and marketing) [4]. As a result of all these actions, traditional banks will be able to increase their capacity to develop solutions that can meet the needs and desires of both existing and potential customers.

6. Revision of labor resources in favor of more qualified personnel.

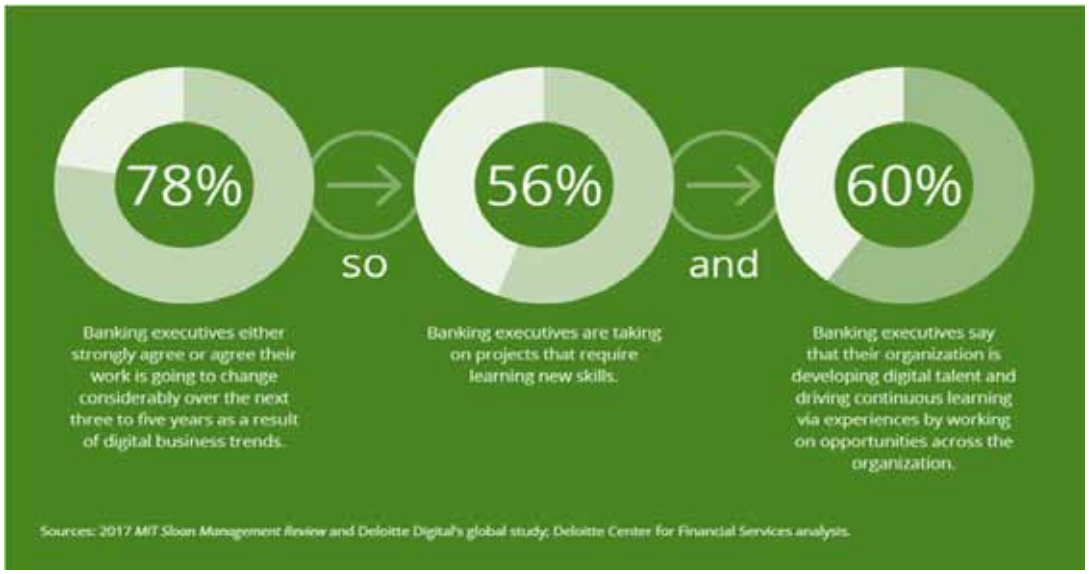

Fig. 1. **Modular Learning Based on Artificial Intelligence Technology in Singapore**

Source: 2017 MIT Sloan Management Review and Deloitte Digital's global study: Deloitte Center for Financial Services analysis. URL: https://www2.deloitte.com/kz/ru/pages/financial-services/articles/gx-banking-industry-outlook.html (accessed on 12.12.2020).

Banks should rethink their talent strategies in light of the changing working conditions caused by the increasing level of automation and ethno-cultural diversity of the workforce.

There is no doubt that automation is rapidly transforming business processes, and advances in technologies such as quantum computing are likely to accelerate these changes. It would seem natural, given the inevitably increasing volumes of automation, to ask the question of what impact it will have on workplaces [5], however, the banking industry has already gone through a similar stage [6]. For example, when the introduction of ATMs began, it allowed banks to free cashiers from the technical function of processing transactions and reorient them to selling banking services and providing advice to customers [7].

In addition, the workforce is expected to become more ethnically and socioculturally diverse in the future. In addition to permanent employees and contractors, it is likely that freelance specialists will appear, interacting with several banks at once; developers of new fintech services and services and even robots that will work together with people [8].

As a result, it can be expected that in arrange to realize victory in this technological world, a bank as it were has to have specialized masters on its staff, but this approach would be short-sighted — the significance of interpersonal abilities ought to not be thought little of. Banks ought to proceed to way better adjust company procedure with worker values through corporate social duty, natural, community and corporate governance initiatives.

Only 17% of CEOs around the world, working in various sectors of the economy, not to mention the banking sector, when responding to the survey "International Trends in Human Capital", report their readiness to manage a diverse workforce [9].

According to a joint think about by MIT Sloan Management Review and the universal division of Deloitte Digital, in arrange to work successfully in an advanced environment, bank workers will create modern aptitudes and capacities (*Fig. 1*) [10]. A great case in this respect is DBS Bank in Singapore, which has committed 20 million dollars to prepare its representatives in computerized managing an account and innovation development. Secluded preparing takes put concurring to uncommonly planned educational modules on an e-learning stage based on counterfeit insights innovation.[2]

[2] DBS to Invest SGD 20 Million Over Five Years to Transform Employees Into Digital Workforce, in Support of Singapore's Aim to Be Smart Financial Centre. Press release. August 21, 2017. URL: https://www.dbs.com/newsroom/DBS_to_invest_SGD 20_million_over_five_years_to_transform_employees_into_digital_workforce_in_support_of_Singapores_aim_to_be_smart_financial_centre (accessed on 12.12.2020).

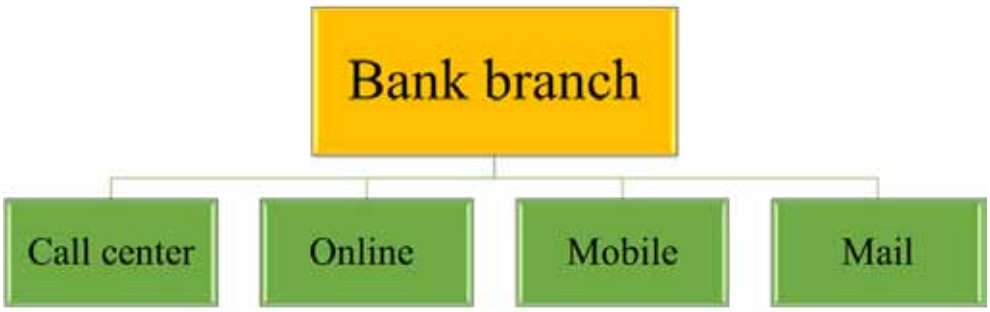

Fig. 2. **Banking model of the past**

Source: Forecast of the banking sector development. URL: https://www2.deloitte.com/kz/ru/pages/financial-services/articles/gx-banking-industry-outlook.html (accessed on 12.12.2020).

As part of the upcoming transformation, banks will need to create a new collaborative and level playing culture and move towards a more coordinated approach to work at all stages of the working process — from hiring to retirement — taking into account customer satisfaction. This new digitally-based approach, will create the necessary work-life balance for employees and define work objectives they should strive for.

Banks need to consider the six main factors when shaping their strategies to ensure sustainable development in the long term. It is believed that there is a long work ahead in this direction, and the sector is currently at the beginning of its journey.

To harvest the benefits of versatile selection, banks have to change their client procurement methodologies, item portfolios and benefit conveyance models. As before long as financial development strengthens, it is essential to fix financial arrangement. Targeting the correct gathering of people through modern information analytics, making the foremost compelling item offerings, and advanced client intuitive with the bank can help lower financing and store costs. Such a compelling technique can be imperative since the liquidity rules presented within the wake of the emergency, in specific the least liquidity prerequisites, might lead to cost wars for retail stores.

This is important to indicate the growing advantage of mobile banking. It is gradually replacing the physical office as the main point of obtaining banking services, providing an even higher level of interaction than using Internet banking (*Fig. 2*) [11]. The use of mobile technology also comes to the fore at key stages of the customer life cycle, in particular when working with customers from key demographic groups — according to the recent Deloitte study [12] generation Y and mobile banking users are likely to demand more account opening opportunities.

However, it would be shortsighted to consider mobile technologies only as another communication channel, because they not only improve the quality of customer service but also contribute to the effectiveness of other channels of interaction with the customer (*Fig. 3*). For example, Umpqua Bank is currently testing a pilot project to implement software that allows employees in the bank's offices to provide banking services to customers via digital communication channels [13].

Expanding customer engagement through mobile channels can help banks address specific compliance issues. Banks can speed up compliance or reduce costs if customers agree or validate data using a portable application. Providing discounts or rewards can act as a motivating force. A customer-recognizable application based on face recognition technology may be used to assist customers and reduce costs of establishing connections with modern customers [14].

Achieving all of this will require more flexible service delivery models, of which mobile is a key element, but they could significantly narrow the gap if they double their digital transformation efforts. For example, large retail banks in Europe and Asia have gone much further on these issues and are creating radically new business models that can significantly change the existing market. Obviously, the main driver of these changes is regulation — the

second European Union Payments Directive (PSD 2) in Europe and the Open Banking Standard in the UK, in particular, establish completely new rules for obtaining and using customer data, and also reduce barriers to market entry [15]. As a result of these changes, banks and fintech companies are rethinking their approaches to using data and introducing new models of interaction with customers in the new digital reality.

Successful digital transformation usually depends on consistency of administrative methods, a choice of innovation, and management adjustments. In an effort to adapt to such extreme changes, banks are making key choices. Indeed, the most popular banks like Goldman Sachs [16], are focusing their efforts on retail and building advanced departmental systems to serve private clients while promoting their competitive account management services.

However, without revising and optimizing business processes, digitalization can be counterproductive. Thus, robotic process automation is likely to gain popularity, but when implementing this technology, it is important to remember that in order to overcome inefficiencies, it is necessary to completely revise existing ways of working, and not just solve problems with a robot. Blockchain technology is expected to gain widespread acceptance, especially in trade finance and corporate payments. This is naturally due to its ability to eliminate duplication and errors in multilateral transactions. For example, seven large banks in Europe have already partnered with IBM to create a blockchain platform for cross-border transactions in the SME segment [17].

High-tech user platforms are designed to help banks cross-sell paid services more efficiently. Using data lakes in banks to store customer information will allow sales professionals to receive the necessary information using a digital interface right at the meeting with a client. These digital tools, which provide access to data from adjacent business units, can enable junior bank employees to work directly with customers without involving more experienced colleagues, and also reduce the number of participants in the service delivery process. All this, in turn, will allow banks to reduce operating costs.

Automation and artificial intelligence are changing many of the competitive edge factors in

Fig. 3. **Banking model of the future**

Source: Deloitte Center for Financial Services. URL: https://www2.deloitte.com/kz/ru/pages/financial-services/articles/gx-banking-industry-outlook.html (accessed on 12.12.2020).

capital markets — when dealing with customers and supporting transactions — which, in turn, have significant indirect impacts on the operations, talent models and business strategies of market participants. The introduction of innovative technologies, especially cognitive automation technologies, in customer service departments can help improve efficiency and create new sources of growth. Operating units will be able to expand the sources of income and increase their stability by dividing the costs of settlement and clearing operations among all parties to the transaction.

Increasingly, banks are adopting smart automation solutions to improve the efficiency of client offices and new products. For example, Goldman Sachs has implemented robots for trading small batches of corporate bonds so traders can focus on more profitable transactions [18]. UBS uses artificial intelligence technologies to develop an innovative "adaptive strategy" offering that adapts strategy to customer requirements [19]. Sophisticated predictive analytics applied to transaction data enable bank employees to anticipate customer expectations.

These technologies, along with others such as blockchain, are also driving changes in the activities of the controlling and operating divisions of banks. However, much remains to be done. These functions may need to be outsourced so that infrastructure and operations are managed by a third party, as capital

markets are too costly for many companies due to reduced sources of revenue. It is possible to improve the management efficiency of such companies, for example, by attracting specialized suppliers of technological solutions.

Banks' ability to stay ahead of these trends can be key to the success and stability of their business models. The shift to electronic trading in the high-margin segment such as interest rate swaps, increased price transparency and new reporting requirements could lead to increased pressure on margins.

Of course, the driver of all this innovation in payment services is the explosive growth of e-commerce. However, live sales are still relevant, and an effective strategy for improving the quality of customer service must be built on the principle of omnichannel.

It is likely that well-informed companies with flexible business models, or companies that can quickly copy new solutions from other market participants and implement strategies that allow them to quickly enter the market, will be able to operate in this rapidly changing world of payment services.

At this time, the transition to a non-cash form of payments is being actively carried out, which accelerates economic growth and the development of the digital economy. Commercial banks in Azerbaijan during COVID-19 were forced to switch to a new remote form of service. Such a transformation of the economy through the banking system can give good results in the near future. Among the main problems in the process of providing banking services in the context of the digitalization of the economy, only possible problems with the Internet or electricity supply stand out, there are no other serious obstacles in this process [20]. The process of formation of state policy from the point of view of innovative development is observed. This can make it possible to form positive agenda from the point of view of the balance of the domestic economy since at present the problems associated with the balance of economic development are considered urgent in the world economy.[3]

Another important problem of the banking sector in Azerbaijan is high bank interest rates. The high percentage of banks in the country on loans causes discontent among the population. Despite the fact that the topic has repeatedly turned into an agenda and a number of steps have been taken, the problem has not yet been resolved. At the moment, consumer loans in Azerbaijan are provided at an interest rate above 20, which seems to the citizens of the country to be completely unprofitable. Commercial banks are the reason for such high interest rates on loans. In fact, banks should not be interested in high interest rates, since high interest rates in the future may increase the risk of loan defaults and complicate the bank-client relationship. Moreover, in modern conditions, during COVID-19, when the normal activities of many areas have been suspended, this problem has become even more urgent. As a result, the commercial bank itself loses, so the country's banks are advised to lower interest rates to single digits. Currently, the Central Bank of Azerbaijan is working on a draft of a new law on the banking system. After the adoption of this law, the situation with bank interest is expected to improve. On the other hand, in our opinion, it is considered mandatory to prepare a new conceptual state program for banking. It is believed that the use of simple methods and foreign practice will solve the problem of high interest rates. High interest rates mean expensive homes, cars, equipment. Bank loans affect all areas of the economy. Most companies sell products and other services precisely through bank loans, which ultimately, due to high loans, increases the prices of goods and services provided by these companies. If, for example, a farmer receives an expensive loan, accordingly, he will raise the price for his products. As a result, the entire load falls on the consumer. To solve this problem, competition in the banking system is considered mandatory, namely, a competitive environment should be formed between banks. If local banks continue to maintain high interest rates, there will be a need to attract banks with cheap investments from abroad. Banks should make serious changes in their activities and meet new challenges; the

[3] The development of an innovative economy in Azerbaijan was discussed. URL: http://news.unec.edu.az/ekspert-reyi/6980-azerbaycanda-innovasiya-tutumlu-igtisadiyyatin-inkishafi-muzakire-olunub (accessed on 22.12.2020).

system should be formed anew. It is also necessary to create a special structure that will control banks. Despite the fact that a body called the "Chamber for Control over Financial Markets" was created in Azerbaijan, it did not meet the requirements and was liquidated [21].

CONCLUSIONS

The results of the study can be presented in the form of the following conclusions characterizing the solution to the set goal of the work:

1. By using different solutions and expanding digital opportunities, banks must ensure that robots provide them with a tangible competitive advantage. Customers will increasingly look to digital experiences to meet their needs.

2. Banks should also focus on data monetization in view of the possible reduction in traditional revenue channels. In addition, investments in data technology and analytics will be required that will use the bank's own unique data to provide broader insights for and about their customers. This in turn will drive further innovation and better business decisions.

3. Beyond technology, evolving talent needs reflect new risks and business opportunities. Highly qualified specialists in the field of building information models and monitoring cyber threats are currently in high demand. Changing customer needs and developing industry mergers are driving the engagement of specialized professionals rather than industry experts (for example, trade specialists who provide service to clients in various businesses).

The advisability of these recommendations is based on the obvious priority of the banking sector. In addition to the fact that banks perform many other functions, they also boost economic growth, while the economic growth of any country improves the social sphere and the well-being of the population.

The modern economy requires unconventional solutions in the banking sector. Modernization and optimization of banking processes, services, improving the quality of service in combination with low distribution costs are key to the successful development of banks in conditions of financial instability.

REFERENCES

1. Srinivas V., Goradia U., Wadhwani R. Managed services: A catalyst for transformation in banking. Deloitte Insights. Mar. 22, 2017. URL: https://www2.deloitte.com/us/en/insights/industry/financial-services/managed-services-in-risk-management-and-regulatory-compliance.html
2. Hida E. Global risk management survey, 10th edition: Heightened uncertainty signals new challenges ahead. Deloitte Insights. Mar. 02, 2017. URL: https://www2.deloitte.com/us/en/insights/topics/risk-management/global-risk-management-survey.html
3. McWaters R.J., Galaski R. Beyond fintech: A pragmatic assessment of disruptive potential in financial services. Geneva: World Economic Forum; 2017. 197 p. URL: http://www3.weforum.org/docs/Beyond_Fintech_-_A_Pragmatic_Assessment_of_Disruptive_Potential_in_Financial_Services.pdf
4. Eckenrode J., Srinivas V. Disaggregating fintech: Brighter shades of disruption. New York: Deloitte Center for Financial Services; 2016. 30 p. URL: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-disaggregating-fintech-brighter-shades-of-disruption.pdf
5. Chanjaroen C. Ex-citi CEO says 30% of bank jobs at risk from technology. Bloomberg. Sept. 13, 2017. URL: https://www.bloombergquint.com/global-economics/2017/09/13/ex-citi-ceo-pandit-says-30-of-bank-jobs-at-risk-from-technology
6. Wladawsky-Berger I. As automation anxiety grows, remember we've been here before: Technological advancements bring new opportunities, and many of the same fears. Wall Street Journal. Sept. 01, 2017. URL: https://www.wsj.com/articles/as-automation-anxiety-grows-remember-weve-been-here-before-1504281268
7. Srinivas V. The future of automation in the banking industry: What can we learn from ATMs? Deloitte Quick Look Blog. July 19, 2017. URL: https://www2.deloitte.com/us/en/pages/financial-services/articles/automation-in-the-banking-industry.html

8. Hagel J., Schwartz J., Bersin J. Navigating the future of work: Can we point business, workers, and social institutions in the same direction? *Deloitte Review*. 2017;(21). URL: https://www2.deloitte.com/us/en/insights/deloitte-review/issue-21/navigating-new-forms-of-work.html
9. Schwartz J., Collins L., Stockton H., Wagner D., Walsh B. Rewriting the rules for the digital age: 2017 Deloitte global human capital trends. Colombo: Deloitte University Press; 2017. 144 p. URL: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/human-capital/hc-2017-global-human-capital-trends-us.pdf
10. Kane G.C., Palmer D., Phillips A.N., Kiron D., Buckley N. Achieving digital maturity: Adapting your company to a changing world. Cambridge: MIT Sloan Management Review; 2017. 31 p. URL: https://www2.deloitte.com/content/dam/insights/us/articles/3678_achieving-digital-maturity/DUP_Achieving-digital-maturity.pdf
11. Bolton D. 61% of people access mobile banking on a regular basis. Applause. Feb. 01, 2017. URL: https://www.applause.com/blog/mobile-banking-adoption-rates
12. Srinivas V., Fromhart S., Goradia U. First impressions count: Improving the account opening process for Millennials and digital banking customers. Deloitte Insights. Sept. 06, 2017. URL: https://www2.deloitte.com/us/en/insights/industry/financial-services/improving-account-opening-process-in-retail-banking.html
13. Crosman P. When your teller is also your digital banker. American Banker. Sept. 21, 2017. URL: https://www.americanbanker.com/news/where-your-teller-is-also-your-digital-banker
14. Qiange Z., Xueqing J. Banks take bold step forward with face tech. China Daily. Oct. 09, 2017. URL: http://www.chinadaily.com.cn/a/201710/09/WS 5a0bf7a5a31061a738405a2b.html
15. Doyle M., Sharma R., Ross C., Sonnad V. How to flourish in an uncertain future: Open banking. London: Deloitte UK; 2017. 36 p. URL: https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/financial-services/deloitte-uk-open-banking-how-to-flourish-in-an-uncertain-future.pdf
16. Gara A. Wall Street heavyweight Goldman Sachs launches its consumer lending platform Marcus. Forbes. Oct. 13, 2016. URL: https://www.forbes.com/sites/antoinegara/2016/10/13/wall-street-heavyweight-goldman-sachs-launches-its-consumer-lending-platform-marcus/?sh=da93b74628b9
17. Arnold M. European banks to launch blockchain trade finance platform. Financial Times. June 26, 2017. URL: https://www.ft.com/content/6bb4f678–5a8c-11e7-b553-e2df1b0c3220
18. Wigglesworth R., Rennison J. Goldman expands algorithmic corporate bond trading. Financial Times. Aug. 16, 2017. URL: https://www.ft.com/content/6d15c274–70ec-11e7-aca6-c6bd07df1a3c
19. Arnold M., Noonan L. Robots enter investment banks' trading floors. Financial Times. July 07, 2017. URL: https://www.ft.com/content/da7e3ec2–6246–11e7–8814–0ac7eb84e5f1
20. Sadigov E. Professor: The banking system is accelerating the transition to an electronic economy. UNEC News. Dec. 19, 2020. URL: http://news.unec.edu.az/ekspert-reyi/6983-professor-bankovskaya-sistema-uskoryaet-perekhod-k-elektronnoj-ekonomike (In Russ.).
21. Mammadov Z. The banking system must be restructured. UNEC News. Dec. 16, 2020. URL: http://news.unec.edu.az/ekspert-reyi/6975-bank-sistemi-yeniden-gurulmalidir (In Azerb.).

ABOUT THE AUTHOR

Yegana F. Veliyeva — Cand. Sci. (Econ.), Department of Finance and Financial Institutes, Azerbaijan State University of Economics, Baku, Azerbaijan
veliyeva_yegana@bk.ru

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Improving Banks' Operating Efficiency with Corporate Clients

V.D. Smirnov
Financial University, Moscow, Russia
https://orcid.org/0000-0002-1243-5349

ABSTRACT

The author studies the recent changes in the operating conditions of commercial banks regarding servicing corporate clients. **The aim** of the study is to find ways in the current conditions to change the approaches of banks to doing business with corporate clients to get more profit. **The theoretical and methodological basis** of the study is the scientific works by foreign scientists and experts on improving the efficiency of banking organizations. The author used the **methods** of qualitative and quantitative analysis of scientific publications, regulatory and legal sources, retrospective statistical data and analytical materials of well-known consulting companies. **As a result**, the author identified areas for improving the internal banking processes: deeper analysis of the client's activities and the industry where they work; high speed of processing client data without requiring to submit the same documents each time; personalization of the offer to the client of the service according to products, price and other conditions that will attract them to develop their business with this bank; development of financial services by the bank that will help the client to direct more funds and attention to their core business. The author **concludes** that introducing new approaches in cooperation with companies allows banks not only to solve the issues of increasing the profitability of corporate business, but also to help bring the return on capital invested by banks' shareholders closer to the cost of capital, which is an important guideline for investors when choosing investment objects.

Keywords: corporate banking; efficiency; digital competitors; Treasury; risks; cost of capital

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INTRODUCTION

The economic crisis has seriously affected the financial position of companies in many industries, that is also reflected in the financial state of banks. They have fewer opportunities to generate income and are forced to create additional reserves for possible (expected) loan losses. The work of banks regarding capital adequacy, provisioning and mandatory liquidity cushion has been more strictly regulated by central banks. This generally leads to decreasing profitability of banking operations. Digital players emerging on the banking field offer customers more convenient, cheaper and more personalized deals. Corporate clients expect banks to be more closely involved in solving their business problems, developing and offering services that will significantly facilitate the work of treasuries in managing cash, currency, interest rate and commodity risks, giving the financial departments of companies more time to resolve issues of financial support for the development of goods and services manufacturing and strengthening the competitive position in their industries.

COMPETITIVE ENVIRONMENT

Corporate banking is a very voluminous market, accounting for about 30% of the total $ 5 trillion in banking industry revenues [1]. Banks provide the following services to manufacturing and commercial companies:

- provide loans and liquidity facilities;
- transactional services: payment processing, cash management and trade finance;
- products for risk management of companies: interest rates, swaps, hedging of operations with foreign currency or commodities;
- corporate finance services, for example, intermediation in attracting equity capital and

placing debt securities traded on the market in mergers and acquisitions.

For many years, the corporate banking business model envisaged that banks use their balance sheets to ensure corporate clients with loans and liquidity (in fact, the impersonal goods that almost every bank has, which determines to a fierce competition between lenders). At the same time, they develop relations with such customers for the sale of commission based high-margin products created to meet other needs of the companies.

Within the "lend and cross-sell" model, the role of the bank was clear and unquestioned: balance sheet capacity and the ability to link clients to products were the key sources of banks' competitive advantage and acted as barriers against potential new entrants into the market [2].

However, new trends in banking regulation, which intensified especially after the 2008–2009 economic crisis, when several large banks collapsed, threatening customer confidence in the reliability of the banking industry as a whole, as well as the development of digital technologies have significantly complicated the work of banks.

Regulatory initiatives which require banks to increase of capital, observe certain limits in their balance sheet structure, to hold liquidity buffers as well as to follow tough regulations regarding customer knowledge and customer documentation to combat money laundering increase the costs for corporate banking businesses and decrease profitability.

Following Jeff Bezos's, the founder of Amazon, business approach "Your margin is my opportunity", digital challenger banks are gradually being introduced into operations traditionally performed by banking institutions only and are working in several directions. Online banks such as the newly formed N 26, Atom, Monzo, Starling, Tinkoff Bank, and subsidiaries of traditional banks (such as Markus by Goldman Sachs and Hello by BNP Paribas) are focusing on the customer experience provided by technological innovation (artificial intelligence, big data, analytics, "cloud", etc.), and doing it without bank branches. Large tech companies including Google, Apple, Facebook, Amazon, Baidu, Alibaba, Tencent, and non-bank payment institutions such as Square, Stripe, PayPal, TransferWise, Gemalto and Ingenico operate without a banking license or are usually licensed with little regulation compared with a traditional bank. They mainly provide certain payments of individuals or small businesses and reduce the role of traditional banks to money storage entities [3].

Despite the aggressive approach of digital competitors, their share in providing banking services for corporations is still very low: 2–3% in the management of company accounts, 1–9% in the provision of borrowed funds, 6–12% in making payments and 2–4% in intermediation in financial markets.[1] In big companies, their share tends to the lower value of the indicated ranges, which is largely due to the fact that such companies cooperate, as a rule, with the largest banking structures that have a serious attitude to modern technologies that are convenient for business. In addition, companies themselves require sophisticated products and end-to-end services beyond the reach of challenger banks.

Significance of the threat of digital competitors to traditional banks is, rather, not in the share of the banking services market they are taking away, but in the fact that providing maximum convenience in terms of the speed and round-the-clock services, as well as the requirements to documents and tailoring services to the needs of the client, they look for opportunities to disrupt the bank value chain where banks are closely linked to customers and investors, and aim at the most attractive (because risk-free) part of banks' income — bank fees. The consequences of this threat are already visible: bank fees and commission income are declining. In particular, the non-interest income of the US banks reached in 2004 almost 46% of operating income, while in 2019, it fell to just over 30% [4].

For now, corporate banks are holding the keys to remain the prime provider of core corporate

[1] Enable Customer Centricity in Corporate Banking. Oracle White Paper. Oracle. 2019. July 16. 15 p.

banking services to the real economy. However, there is no reason for complacency. To remain relevant and viable, corporate banks "need to deliver excellence across the value chain — in the near term to preserve returns, while in the medium-term to protect their incumbent position from new types of competitors" [2].

The other side of the competitive environment is rivalry for the customer between traditional banks. As the volume of transactions and its complexity and geographic diversification are growing companies tend to expand the range of banks with which they interact. For transactional banking, 34% of the largest global firms work with 11 or more banks, and 40% ones have more than 150 bank accounts. Even the smallest businesses usually partner with more than one bank. Only 16% of respondents reported doing business with a single bank [5].

However, the concept of the primary bank where the company's operations are aggregated and their main part is conducted remains. In this regard, companies show reasonable conservatism: no one is particularly in a hurry to change their primary bank; companies rather motivate their banks to develop the operations they need. If the bank does not provide a service to the required extent and scale, only then the corporate client will think about changing their primary bank. For example, consumers in the UK change their primary bank only once every 15 to 20 years on average, based on data from the UK's Competition and Markets Authority [6].

BANK CAPITAL: RISKS OF DECREASE AND POSSIBILITIES OF REPLENISHMENT

Requirements to increase bank capital are determined, first of all, by the regulators' concern about the sustainability of the banking system as a reliable custodian of its clients' savings and funds to the downside risks of the solvency of borrowers, which is also aimed at creating a liquidity cushion by banks. Therefore, banks are forced to raise additional funds in capital. As a result, their state in terms of the capital base has become more stable by 2018. Tier 1 capital has globally reached 6.75% compared to 6.66% in 2011 [7]. This significantly exceeds the Basel III standards for the risk-weighted Tier 1 capital (4.5%). However, few banks in recent years have generated income that exceeds the cost of their capital [8] (currently about 12% [7]), since the average net return on equity in the banking industry is about 9.6% [7]. The main reasons for this situation are an increase in provisions for loans granted and a decrease in fee and commission income.

Considering the economic profit of banks, which is calculated taking into account the cost of refinancing, operating costs and risk provisions, and is a comprehensive indicator of the financial health of banks, and also serves as a useful indicator for determining the impact of pressures of current regulatory requirements, digital and direct competitors on efficiency of banking, the situation is also not very attractive, since 2014 this indicator has fallen from 15 basis points to 6 in 2018 for the entire banking industry in the world [9].

Even before COVID-19, bank profitability was on the wane amid growth of bank capital and a much more significant increase in lending to the real sector. This occurred both as a result of a nominal increase in capital of banks, which allowed them to expand their lending opportunities to the economy, and cheapening of borrowed funds due to the easy money policy pursued by many central banks. According to Standard&Poors, the last decade shows an extraordinary rise in leverage (debt burden), which has raised the median debt ratio from 80% of EBITDA (earnings before interest, taxes and depreciation) in developing countries only, i.e. the debt was less than the funds available to companies in 2008, to two time exceeding the debt in 2019 over the amount of funds available to companies.[2] The transition of the global economy into the crisis has increased the pressure on banks in terms of provisions for increased loan portfolios and

[2] URL: https://www.vedomosti.ru/salesdepartment/2020/08/24/vliyanie-covid-19-na-kreditosposobnost?utm_campaign=newspaper_25_8_2020&utm_medium=email&utm_source=vedomosti (accessed on 10.12.2020).

further complicated the situation with bank profitability.

The bank capital is base of its reliability, which is the main characteristic of banking institutions, and also determines their lending activity. Therefore, it is clear that not only regulators, but also the bank's owners, are concerned to replenish it. Given that the capital available to banks exceeds the corresponding requirements of Basel III, we can state that banks have built significant capital buffers and, according to McKinsey experts, operate in the "cushion zone". In coming months and years, banks might pass into the "caution zone", considering that $ 100 billion to $ 400 billion in common equity tier-1 (CET1) capital would be wiped out due to the losses in the current crisis. Capital formation from retained earnings will drop from a level equivalent to 0.5 to one percentage point of CET1 yearly to only 0.2 to 0.5 percentage point, thus making organic recapitalization much slower [10]. Unfortunately, raising funds in capital on the open market for banks is a big problem due to the low ratio of capitalization to the current net asset value (0.93 in the banking system as a whole in 2019) and a downtrend in recent years. At the same time, traditional banks' competitors — technology companies — are rated much higher (10.36 in 2019 on average for Google, Apple, Facebook, Amazon) [11]. The growth prospects in the market value of such investments are bright. Competition for capital between traditional banks and technology companies, including fintech companies, is not entirely equal: the capitalization of such companies grows, even if they do not generate profits. The best example is the growth in capitalization of Tesla, which has exceeded the value of the three largest automakers producing dozens of times more cars and make a profit. While bank's value falls even with a stable profitability. However, investors are investing more in businesses that are likely to provide greater returns in the future. The problem with banks is that investors don't feel like banks will be able to generate future returns higher than the cost of capital. That is why banks should pay attention to this problem.

At the same time the success of 350 of the 1250 largest world banks, which, according to Ernst & Young, have consistently shown returns above the cost of capital over the past five years [11], means that the banking industry should not perceive the current trends as a "new normal" of low returns. It is better to understand how they achieved these results and follow them to provide sufficient returns for capital replenishment given the present phase of the economic cycle. It will be difficult to do, since the growth of the banking sector remains subdued: growth for the banking industry continues to be muted — industry revenues grew at 2% per year in 2014–2018, significantly below banking's historical annual growth of 5% to 6% [1].

> *To remain relevant and viable, corporate banks "need to deliver excellence across the value chain — in the near term to preserve returns, while in the medium-term to protect their incumbent position from new types of competitors"*

Banks should seriously consider new revenue streams and to low their operating costs to increase profitability above the cost of capital. This will undoubtedly help to resolve the issues of capital replenishment both by distributing part of the profit to capital and by raising funds in open markets.

In the current environment, the increase in profitability is primarily associated with the maximum satisfaction of corporate clients with the quality of banking services and its versatility in such areas as acceleration and simplification of internal banking processes, the use of extensive analytics to provide services in the management of funds and risks associated with the activities of companies, as well as assisting corporate clients in supply chain and sales financing. Such client centricity instead of product

orientation requires significant investments in technology, changes in business models, and a new approach for bank staff to understand work priorities. The main objective of bank employees should not be the amount of income received (by any means) from the sale of their products. It is necessary to strive to get customer satisfaction from the bank's assistance in solving the company's credit and financial issues. Satisfied customers will then acquire more banking services, and the bank will earn from sale of its.

This change in the approach to working with corporate clients is a serious challenge for banks, but at the same time it is an opportunity to show how the bank is differentiated from its competitors.

In corporate banking, besides a product several additional factors play a part, among them pricing, streamlined processes, operational excellence, relationship management, and international presence. With intense competition increasingly levelling the corporate banking playing field at a product level and in order to avoid only price competition for commercialized products, banks must differentiate themselves with expertise and excellence [5].

Investments in this development in order to win the competition require a strengthening of the bank capital, which is not easy. It is especially difficult for small banks that do not have the opportunity to make such investments or to stand out in any other way against large competitors. As a result, small banks cease their activities or merge with larger ones, and the number of banks worldwide is decreasing: the number of commercial banks, along with a well-known trend in the Russian Federation, for example, in the United States, decreased by 33.3% from 2009 to 2019 (up to 4653), and in the EU — by 34.5% (up to 11,948) [9]. For the remaining small banks, the volume of business is decreasing: in the Russian Federation, from 2013 to 2020, the share of regional credit organizations in lending to non financial entities fell almost threefold — from 7.3% to 2.7% of total corporate debt to banks.[3]

WHAT THE BANK'S CORPORATE CLIENT WANTS

As a rule, the current work with banks is carried out by the head of the treasury (in a large company) or the CFO. This work is divided into two parts: (1) managing day-to-day operations and (2) addressing long-term strategy and business risk management issues, which financially relate to reducing the need for working capital, including solutions along the entire external value chain (primarily, with suppliers and buyers), reducing the cost of raising funds to finance its deficit, as well as managing the risks associated with the growing uncertainty in the commodity and foreign exchange markets.

In the first group, these financial leaders strive for fully digital and hassle-free management of recurring operations. In the second group, where the problems are difficult to solve without qualified business partners, companies would like to receive advice and cooperate with them on a wide range of financial issues.

It is clear that the current operations can be carried out by many banks corresponding to the level that satisfies the client. In terms of consulting, there are serious differences in the ability of different banks to offer convenient and timely advice and services to their corporate clients. These abilities are most appreciated by companies. In the global survey by Ernst & Young, 67% of CFOs indicated that the advisory services provided by many of their core banks are the top benefit of their relationships, and 50% of respondents noted the importance of new ideas and in-depth knowledge of the bank in the industry.[4]

Corporate clients are not just looking for expertise on a specific financial issue, they are interested in the following:

[3] URL: https://www.raexpert.ru/researches/banks/fed_banks_2020 (accessed on 10.12.2020).

[4] Successful corporate banking: Focus on fundamentals. Ernst & Young; 2013. 30 p.

• innovative ideas that are specific to their industry and enables them to tackle their unique business situations by looking at the problem from a different angle;

• integrated end to end solutions that connect all the silo lines of financial activity of corporates which includes operations with bank, suppliers, buyers, partners and others to enable companies to work out a holistic solution;

• customized and innovative products and services that cater to their specific business need.

It is clear to companies that banks are also commercial organizations seeking to make money. However, it is unacceptable for companies when banks try to convince a corporate client to buy products or services that they do not need. Companies are ready to give the bank more business if it makes a competitive price offer for the required service or if the bank provides the company with interesting information or advice. Companies, of course, want to receive these services "at the best price, but they do not want to bring price discussions to a situation that will not be beneficial to either the bank or the company".[5] As usual, this should be a compromise between the rate and the mass of profit: a little less income of a bank for a specific operation, but a larger volume of transactions with a client that allows the bank to earn more profit on a client, while the company allocates more its banking operations in favor of the bank that most comprehensively solves its problems, making it possible to generate more profit in its core business.

For companies in the non-financial sector of the economy, financial management is an important task. However, its main objective is to produce a highly competitive product or service and to gain its place in the competition in the relevant market. From this perspective, financial management costs are more a non-core expenses that is considered worthwhile to reduce (according to HSBC, in 2018, 60% of CFOs in larger businesses say treasury has received either no additional resources or they have been cut in the past two years[6]), and at the same time to increase the profitability of financial management. In addition, the financial part of the company's activities must ensure realization of the company's production plans. Banks should focus their efforts in this direction to help non-financial companies solve these problems and, as a result, make money on this cooperation.

Competition for capital between traditional banks and technology companies, including fintech companies, is not entirely equal: the capitalization of such companies grows, even if they do not generate profits.

Large companies with exceeding liquidity are characterized by the creation of their own internal quasi-banking pools, where temporarily surplus funds of some divisions are not placed on bank accounts and deposits, but are channeled within such companies as internal loans to subsidiary divisions in need of funds. The logic of corporate treasurers is as follows: the difference between income on a deposit at a bank and expenses with a simultaneous loan from the bank, considering additional bank commissions, is greater than the cost of a direct internal loan, i.e. the total corporate costs for transactions within the corporate pool are lower; there are no obligations to provide collateral, the terms of the loan can be adjusted as much as necessary, the procedure for internal lending is carried out much faster than banks usually do.

Therefore, the objective of corporative banking is to make its services better, cheaper and faster than the corporate treasury does so that the company as a whole gets more benefits from cooperation with the bank and can not

[5] Successful corporate banking: Focus on fundamentals. Ernst & Young; 2013. 30 p.

[6] Rethinking Treasury. Executive summary. HSBC; 2018. 4 p. URL: hsbc-cfo-treasury-survey-executive-summary.pdf (accessed on 10.12.2020).

only reduce its treasury costs, but also increase the effectiveness of managing its finances compared to the work of its treasury. If a bank does not transform its corporate operations in this way now it risks losing its business to other traditional banks or companies will transfer their banking operations to its in-house banks to proceed with corporate finance or will try to leverage fintech partnership to get differentiated digital offerings.[7]

Smaller companies may not have a task to effectively allocate their funds within the company's subsidiaries. However, there is definitely a need to reduce the cost of financial management and increase the efficiency of financial support for production development.

In the context of growing uncertainty in almost all markets, when choosing their primary bank, financial managers of companies pay special attention to the factors of stability and reliability of such a counterparty. While price issues remain very important, the value of the range of services, the level of service and knowledge of the client's business is growing. Every CFO in a 2018 Boston Consulting Group survey stated that without trust in the bank, these people in charge of corporate finance simply cannot place huge amounts of company money in the bank, for the safety and growth of which they are personally responsible [12]. Since trust is difficult and long to earn, these leaders are often considered very conservative in the choice of banking partners, which, in turn, determines the rare change of banking partners by companies. This approach is highly justified: no one will risk the company's money for slightly more favorable price conditions if the risks of losing this money increase.

CFOs want their bank to "help them prioritize, share best practices, and help them be more efficient" [12]. At the same time, the context of the interaction desired by companies is radically changing. Instead of contacting only a client manager or a senior banker, companies want to organize cooperation within the integrated groups of the bank and the company in the relevant areas of work: the bank's IT specialists should work directly with the company's IT specialists, treasury operators — with employees of the bank's operational departments, specialists in risk management of the company — with the relevant bank employees [13].

Among the specific areas where CFOs expect constructive help from their banks, the most important are the following:

- accounts receivable management, hedging and factoring;
- reduction of risks associated with suppliers of raw materials, materials and services;
- financing the value chain of both suppliers and buyers;
- management of currency, interest rate and commodity risks and liquidity.

According to the PwC research, the priority of choosing a partner bank by companies in 2019 (in order of importance) is:

- funding of the company's activities;
- product and service capabilities of the bank;
- the cost of banking services;
- a successful history of relationships;
- overall economic efficiency for the company [14].

Thus, corporate clients are looking for a reliable and experienced partner able to provide convenient banking services, as well as a responsible business consultant to advise them on strategic business development and financial management and related risks.

IMPROVING BANKS' OPERATING EFFICIENCY TO SATISFY THE NEEDS OF CORPORATE CLIENTS

Fundamentally important for corporate clients the reliability and safety of banks that form trust can be realized today only through highly efficient technologies and processes integrated with companies. These, in turn, can be implemented with a clear understanding by the bank management of the development perspectives. In this context, the study of options for further development, i.e. uncertainty

[7] Enable Customer Centricity in Corporate Banking. Oracle White Paper. Oracle. 2019. July 16. 15 p.

assessment requires special attention, because the volume and direction of investment in such development depend on the approved scenario of future development. A problem is traditionally strategy is developed with analytical tools that are supposed to be able to predict strategic development with sufficient accuracy. But in conditions of increasing uncertainty, in which it is difficult to reliably express the future in numbers, "this approach is at best marginally helpful and at worst downright dangerous: underestimating uncertainty can lead to strategies that neither defend a company against the threats nor take advantage of the opportunities that higher levels of uncertainty provide. Another danger lies at the other extreme: if managers can't find a strategy that works under traditional analysis, they may abandon the analytical rigor of their planning process altogether and base their decisions on gut instinct" [15].

For example, the idea of many states to get rid of cars with internal combustion engines in the medium term seems quite attractive. Deeper analysis, however, reveals that the electric car is only clean in the place where it is, and the overall efficiency of generating energy for it is not very high. Well-known Russian entrepreneur in the field of new technologies Mikhail Lifshits notes that when generating electricity at a thermal power plant through electric networks, the car will get at best 25% of the initially used fuel. The direct use of fuel in internal combustion engines in combination with generators that recuperate energy during braking is more efficient from the point of view of using the produced fuel [16]. Thus, decisions based on populist/superficial analysis may not lead to saving fuel resources and protecting the environment, as declared, but to even more fuel consumption and environmental pollution.

Misconceptions about future development are extremely dangerous in banks as well, because wrong decisions cannot help them to win in the competition. As soon as companies are looking for complex end-to-end solutions that require closer corporate connectivity to banks, real-time status updates and full transparency of all banking functions, multi-channel banking and superior digital interactions together with advanced portfolio management and personalized products and services tailored to unique industry and business — customer needs, based, among other things, on deep industry and historical analytics, it seems that banks have no alternative to significant investments in digitalization of internal processes.[8] Globally, the costs of universal banks on innovation are very high and account for 6–12% of their revenues or 15–20% of all bank expenses. While technologies support all core business functions, most banks have limited flexibility working across fragmented legacy infrastructure that has developed over the years [17].

These investments should serve three purposes:

- improving the quality of customer service by moving from product orientation in sales to comprehensive customer satisfaction;
- increasing income based on the results of processing more relevant, deeper analytical data;
- reducing cost by simplifying, automating and increasing the reliability of internal bank operations and reporting.

When analyzing the current operating costs on an operation or a business line compared with the effect of the proposed investment, it is advisable to "have a clear idea of what contributes to the increase in value and what does not … The fact that the activity is less costly does not mean that it creates more value" [11]. That is, we need to weigh the effectiveness of cheap versus expensive transactions, considering that the latter may well bring in more cost-weighted income.

The innovations introduced by banks are not intended to replace bank specialists, but are aimed at comprehensive support of their activities to reduce their involvement in routine operations and provide as much information as

[8] Enable Customer Centricity in Corporate Banking. Oracle White Paper. Oracle. 2019. July 16. 15 p.

possible for analysis and constructive dialogue with corporate clients.

For example, the complex system of intelligent operations offered by the Boston Consulting Group cover automation of repetitive mass operations regulated by certain rules based on robotic process automation. Improving the collection and processing of information using Big Data and Machine Learning technologies, Artificial Intelligence makes it possible to better sense trends, predict future development, help to prevent the implementation of negative scenarios and make better decisions.

Considering that 55% of the employees of universal banks involved in key functions are engaged in repetitive processes [18], the implementation of such a system makes it possible to qualitatively change the work of bank staff towards more creative analytical work, so that they can focus on activities that increase added value based on deep processing a vast array of data, simplification and increase reliability and reducing the erroneousness of routine operations, reducing the time of operations and requirements for customers for the information demanded, development and proactive offering companies the service they need, taking into account a comprehensive analysis of their activities [19].

The main result of such transformations is the staff orientation towards creating additional value for the bank, converting the satisfaction of corporate clients into a larger volume of bank services they buy, including transferring to the bank solutions to those tasks that are usually realized by corporate clients themselves. This is due to the bank, having reorganized itself and freed itself from outdated and expensive approaches to conducting its activities, is becoming better prepared to perform its traditional tasks and, that is no less important, to implement innovative services required by its clients.

The difference in returns on shares between banks that change themselves in this way and banks that do not seek to do so is wide and is worth 17 basic points of RoE (before taxes) [2].

It is necessary to pay attention to the components of this gap in profitability in the context of the bank value chain, which is formed from relations with clients, the development of appropriate products and services and solutions for their structuring for the client, the implementation of operations and transactions, lending, the provision of investment banking services.

Strategically, the banks' operating efficiency largely depends on the client segment by industry, the volume of operations, the level of acceptable profitability of its operations, compliance with the principles of sustainable development, etc., since these parameters determine the acceptability of the risk for the bank and the volume of provisions.

Correct pricing does not mean the lowest prices for banking products and services, but the ability to provide the right product when the client needs it, along with other services the customer requires with a focus on providing as many services as possible that the client really needs. As a result, the bank receives from the client the required share of operations, and the price is calculated based on the entire business of the bank with the client. It often turns out to be very high for one operations and low or market average for another ones, but the client agrees to this because of the bank's comprehensive approach to its service. The client manager, who is fully immersed in the client's business, has a great influence on the transaction price.

Full automation of standard processes and the bank's ability to provide a client with a personalized offer, considering its specifics by industry, size, current state of operations, etc. determines the bank's capabilities in terms of the range and quality of services provided to a corporate client, which, in turn, facilitate cross-selling. The effective use of capital and liabilities, the search for their stable sources in terms of cost and matirity to increase the efficiency of active operations is the foundation of the bank's active operations to provide borrowed resources to corporate clients.

Experts of consulting firm Celent in a specialized study of corporate banking trends conducted in cooperation with the technology company Finastra note that the correlation of cross-selling with lending is significantly higher compared to transactional transactions. They state that 75% of borrowers purchase other bank corporate services, which gives 76% of all commissions from transactions with corporate clients, because there is a potential for new commissions and interest income from payments, money management and hedging for each trade transaction or financed invoice [6]. This also happens when the bank is able to respond to the specific requests of the company regarding lending collateralized with the client's assets, reducing the risk of non-payment by the buyer, currency, interest, commodity risks, and reducing the need for working capital. This integrated approach gives an increase of 60% in the volume of business with a client and 40% in profit on assets allocated to this client [13].

This approach means personalizing customer interactions based on a deep understanding of each customer's unique needs and orchestrating a set of tailored experiences across digital and human channels. A similar approach might be taken by a skillful sommelier who changes a wine recommendation on the basis of a customer's tastes, mood, and resources. Personalization potentially creates a win-win scenario for banks and the customers they serve. The Boston Consulting Group estimates that for every $ 100 billion in assets that a bank has, it can achieve as much as $ 300 million in revenue growth by personalizing its customer interactions, that also drive to a material competitive advantage for first movers that embrace it over the next five years [20].

Analysis of the structure of economic profit, which brings the bank's work with corporate clients, shows that approximately 1% of the total number of serviced companies makes the greatest contribution to its decrease. To get rid of them before repayment of the debt is very costly. Instead, some banks have recognized that the more efficient way is to find the right model for the mutually sustainable relationship. This is due to understanding the client's potential, honest dialogue and drawing up a clear action plan when refinancing or checking the company's activities. Often, the realization that the bank is tracking profitability stimulates the situation to improve, because the client realizes that he will not be able to stay out of control for long with cheap/extra loans and empty promises. The next priority of the bank will be to transfer a client with a negative margin to a group with a moderate return on risk-weighted assets, for example, in the range of 2–4% [21].

Banks will be able to act no worse, and most likely better than large technology and specialized fintech companies in terms of approaches to customer service, which is likely to become one of the main areas of competition, where, in addition to the product competition, the ways and time of product delivery to the client, the readiness and ability of the bank to solve urgent problems of the client are important

In terms of the structure of products offered to companies, it should be noted, transaction services are responsible for more than 40% of global banking revenues and its key growth drivers are reassuringly stable. Payments and documentary trade-related business have been the primary growth engines for most banks in 2016–2019. McKinsey's latest global banking survey shows that 71% of respondents cite payments as the number one growth driver in money management and 67% cite documentary business in trade finance. In second place in money management is accounts and deposits while in trade finance it is factoring (and reverse factoring). Transactional foreign exchange operations

is also cited as an important driver of growth, with 57% of respondents saying it was a key revenue generator over the past three years. Looking forward, however, there are signs that perspectives on growth drivers are starting to shift. A majority of bankers say liquidity management, documentary business, and supply-chain finance are the most promising product lines, with growth likely to reach 5% or 6% annually. About every fifth of those surveyed believe liquidity management and deposits could see growth of more than 10%, while about the same number see the same in supply-chain finance [22].

Banks' ability to invest in innovation that can reduce costs and increase revenues often depends on the scale of the business. Over the longer term, the growing role of scale in the business is a challenge for smaller and mid-sized players. Smaller players have historically been able to retain a stronger footing with corporate clients than with institutional clients, through tailored local capabilities and strong relationships. This is now changing. For example, the payments business is at the forefront as the efforts of several reputable global transaction banks to change infrastructure are helping to achieve much larger scale benefits.. The world's largest players in the payments market in 2019 received 1.9x more revenue for every dollar of operating expenses compared to the average players. This discrepancy is only likely to become more pronounced over time, as the large players invest further, aiming to drive down costs and improve service quality, and to develop new propositions to fend off incursions from FinTech, BigTech and greenfield challengers. According to Morgan Stanley and OliverWyman, in 2019 large players spent 5–10 times as much on technology innovation as mid-sized providers [23].

CONCLUSIONS

It's becoming apparent that banks require a serious transformation of internal processes. Otherwise they will not be able to improve their efficiency, reduce costs, meet regulatory requirements, neutralize the aggression of digital challengers, or increase revenues by offering corporate clients new services based on in-depth knowledge of the company and the industry and aimed at comprehensive assistance in the field of credit and financial services to develop the client's business.

As a result, banks will be able to increase the return on equity invested by shareholders, reach and exceed the cost of capital, and further strengthen their balance sheets.

At the same time, banks will be able to act no worse, and most likely better than large technology and specialized fintech companies in terms of approaches to customer service, which is likely to become one of the main areas of competition, where, in addition to the product competition, the ways and time of product delivery to the client, the readiness and ability of the bank to solve urgent problems of the client are important, but not selling by any means its products to the customer.

The change in the paradigm of the bank's relations with corporate clients shifts, in the author's opinion, the focus of both theoretical and applied analysis of the bank's activities from the effectiveness of traditional banking products offered to such clients to the effectiveness of cooperation on a wider range of services, including those that go beyond the usual service. It is widely believed that this issue is resolved by the bank's ecosystem, by which, however, it seems that one should understand not the sale through it of products not related to banking activities (this gives additional commission income, but does not tie the client to the bank, since there can always be a more competitive offer), but offering such services that free corporate clients from non-core activities to solve their key business tasks, reducing the costs of work related to managing their own finances and expanding opportunities for earning additional income through the intellectual information on the client's business provided by the bank. Previously, banks did not see cooperation from

this perspective with such clients. Now it makes sense to do it.

With this approach, banks become almost inseparable of a corporate client. This creates a solid foundation for mutually beneficial long-term relationships, which, in turn, significantly changes approaches to banks' activity estimations.

REFERENCES

1. Dietz M., Jenkins P., Kapashi R., Lemerle M., Mehta A., Quetti L. New rules for an old game: Banks in the changing world of financial intermediation. McKinsey Global Banking Annual Review 2018. Washington, DC: McKinsey & Co.; 2018. 52 p. URL: https://www.mckinsey.com/pl/~/media/ClientLink/New%20rules%20for%20an%20old%20game%20Banks%20in%20the%20changing%20world%20of%20financial%20intermediation/Banks-in-the-changing-world-of-financial-intermediation-GBAR.pdf
2. Schnarr T., Pfeiffer M. Delivering excellence in corporate banking: How to protect the business model and improve performance. New York: Oliver Wyman; 2015. 29 p. URL: https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2015/jul/LON-MKT10303–003-Corporate-Banking-report-2015.PDF
3. McIntyre A., Skan J., Caminiti F. Beyond North Star Gazing. How our four winning bank models map to actual market evolution. Dublin: Accenture; 2018. 28 p. URL: https://www.accenture.com/_acnmedia/PDF-85/Accenture-Banking-Beyond-North-Star-Gazing.pdf
4. McIntyre A. Top 10 Trends for 2020. The Weather Could Get Stormy. Forbes. Jan. 09, 2020. URL: https://www.forbes.com/sites/alanmcintyre/2020/01/09/10-banking-trends-for-2020-stormy-weather-ahead/?sh=2ab1a9ca1c06
5. Singh-Jarrold B., Hines P. Connected corporate banking: Breaking down the silos. London: Finastra; 2017. 60 p. URL: https://www.finastra.com/sites/default/files/documents/2018/03/market-insight_connected-corporate-banking-breaking-down-the-silos.pdf
6. Nielsen N.P., Olsen T., Harris K. Banking strategy for the long game. Bain & Company. Sept. 17, 2017. URL: https://www.bain.com/insights/banking-strategy-for-the-long-game/
7. Srinavas V., Schoeps J.-T., Ramsay T., Wadhwani R., Hazuria S., Jain A. 2020 Banking and capital markets outlook: Fortifying the core for the next wave of disruption. Shanghai: Deloitte China; 2020. 56 p. URL: https://www2.deloitte.com/cn/en/pages/financial-services/articles/2020-banking-and-capital-markets-outlook.html#
8. Le Boulay G., Saudjana E., Dany J., Goyal D., Baumgärtner C., Van den Berg P., Shehu Beetz E., Benayad A., Orain F. The new reality for wholesale banks. Boston Consulting Group. Nov. 07, 2019. URL: https://www.bcg.com/ru-ru/publications/2019/new-reality-wholesale-banks
9. Grasshoff G., Coppola M., Pfuhler T., Bochtler S., Gittfried N., Vogt P., Wiegand C. Global risk 2020: It's time for banks to self-disrupt. Boston Consulting Group. Apr. 21, 2020. URL: https://www.bcg.com/ru-ru/publications/2020/global-risk-time-for-banks-to-self-disrupt
10. Buehler R., Dietz M., Fumagalli F., Levy C., Lund S., White O., Windhagen E. Banking System resilience in the Time of COVID-19. McKinsey & Company. July 28, 2020. URL: https://www.mckinsey.com/industries/financial-services/our-insights/banking-system-resilience-in-the-time-of-covid-19
11. Bellens J., Moden N., Karwel J., Meekings K., Gilder A. Banking in the new decade: Three big bets to boost profitability and free-up capital to invest in transformation. Aberdeen: Ernst & Young; 2020. 28 p. URL: https://www.coursehero.com/file/65959861/ey-banking-in-the-new-decade-three-big-bets-to-boost-profitability-and-free-up-capital-to-invest-in-/
12. Barbey K., Burghardt M., Dab S., Fersztand P., Jung Y., Levet J., Sénant Y., Subramanian S., Tang T., van den Berg P., Wee C.K. Corporate treasury insights 2018: A game of trust. Boston Consulting Group. June 04, 2018. URL: https://www.bcg.com/ru-ru/publications/2018/corporate-treasury-insights-2018
13. Fremlin P., King J., Mathias P. Understanding corporate clients: Why banks need to rethink their business models and approach to client relationship management. *Journal of Payments Strategy & Systems*. 2008;2(2):119–126.
14. Di Paola S., Cohen E., Vandenhaute D., Mannaerts M., Stebbings D., Rebel B., Borly C., Kulkarni A., Williams C., Asllanaj R., Russo B., Korykora S. Digital treasury — it takes two to tango: 2019 global treasury benchmarking survey.

London: PwC; 2019. 35 p. URL: https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/2019%20PwC%20Global%20Benchmarking%20Survey.pdf
15. Courtney H.G., Kirkland J., Viguerie S.P. Strategy under uncertainty. McKinsey & Company. June 01, 2020. URL: https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/strategy-under-uncertainty
16. Ульянов Н. Мы системно боремся со здравым смыслом. Эксперт. 2020;(6). URL: https://zaorotec.ru/content/my-sistemno-boremsya-so-zdravym-smyslom/
Ul'yanov N. We systematically fight common sense. Expert. 2020;(6). URL: https://zaorotec.ru/content/my-sistemno-boremsya-so-zdravym-smyslom/ (In Russ.).
17. Graseck B., Stoklosa M., Cyprys M., Hamilton B., Sharma A., Gosalia M., Miotto G., Kenny R., Edelmann C., Davis J., Rosberg M., Holroyd B., Gorski J., Lambert O. Wholesale banks and asset managers: Winning under pressure. New York: Morgan Stanley; 2018. 46 p. URL: https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2018/march/Wholesale-Banks-Asset-Managers-Winning-Under-Pressure-2018.pdf
18. Rorrer J. Better everything: A faster path to creating a next-stage credit operational model. Dublin: Accenture; 2018. 10 p. URL: https://www.accenture.com/_acnmedia/pdf-79/accenture-better-everything-faster-path-creating-next-stage-credit-operating-model.pdf
19. Hayes D., Haider L., Ravindran D., Dobrzynski L., Intriago Velez J.-C., Brackert T. Banks can outsmart the competition with intelligent operations. Boston Consulting Group. Sept. 19, 2019. URL: https://www.bcg.com/ru-ru/publications/2019/banks-outsmart-competition-intelligent-operations
20. Brodski S., Desmangles L., Fanfarillo S., Khodabandeh S., Palumbo S., Santinelli M. What personalization in banking really mean? Boston Consulting Group. Mar. 12, 2019. URL: https://www.bcg.com/publications/2019/what-does-personalization-banking-really-mean
21. Huber J.-A., Steclik I., Olsen T. How banks can turn around unprofitable corporate clients. Bain & Company. May 16, 2017. URL: https://www.bain.com/insights/how-banks-can-turn-around-unprofitable-corporate-clients/
22. Botta A., Digiacomo N., Germann F., Hoell R., Sasia E., Jain R. Global transaction banking: $ 1 trillion question. Washington, DC: McKinsey & Co.; 2019. 11 p. URL: https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/Global%20transaction%20banking%20The%201%20trillion%20dollar%20question/Global-transaction-banking-The-1-trillion-dollar-question.ashx
23. Graseck B., Stoklosa M., Kenny R., Dobewva I., Shah V., Davis J., Walsh D., Rosberg M., Warsmann M., Mihov V., Fernandez P. Steering through the next cycle. Corporate & investment banks/global. New York: Morgan Stanley; 2020. 32 p. URL: https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2020/apr/Oliver-Wyman-Morgan-Stanley-Wholesale-Banks-2020.pdf

ABOUT THE AUTHOR

Vladimir D. Smirnov — Cand. Sci. (Econ.), Assoc. Prof., Department of World Finance, Financial University, Moscow, Russia
vdsmirnov@fa.ru

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Interbank Competition in the Russian Banking Market

O. Yu. Donetskova
Orenburg State University, Orenburg, Russia
https://orcid.org/0000-0002-7849-4034

ABSTRACT

The stable development of the banking sector is closely related to interbank competition. **The subject** of the research is the improvement of interbank competition, which contributes to improving service quality standards, reducing costs and prices, expanding the product line, and clearing up the market from weak and unscrupulous participants. The study **aims** to make recommendations for improving interbank competition to ensure the stability of the country's banking sector. The work employed the analytical **methods** of analysis, synthesis, comparison, graphic method. The theoretical aspects of the subject helped the authors to formulate their concept of interbank competition as the bank competition attractive sources of accumulating resources and placing them considering the customer-oriented approach and in order to ensure their stability in the banking market. The practical analysis relies on statistical data from the Bank of Russia and reflects the uneven distribution of banks across the country with the dominance of banks with state participation. The systematic and integrated approaches of the study made it possible to identify the main trends in interbank competition: monopolization, centralization, concentration of capital, federalization, and globalization. The authors **conclude** that a significant decrease in the number of banks against the increase in assets of state-owned banks limits interbank competition. The largest state-owned banks dominate in the country's deposit and credit markets. The Herfindahl-Hirschman index demonstrates the sufficient importance of credit institutions in the market. Foreign banks also influence their competitiveness. The authors proposed measures aimed at strengthening interbank competition: reducing the degree of state participation in the banks' capital by establishing a standard for the permissible state participation in the authorized capital of credit institutions; establishing equal "rules of the game" for all participants in the banking market and excluding state privileges; developing regional small and medium-sized banks through tax and financial incentives. **The prospect** of further research is in a more detailed study of minimizing factors that negatively affect interbank competition.

Keywords: banks; competition; banking market; competitive environment; interbank competition; level of competition

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INTRODUCTION

The relevance of this paper is due to the importance of studying the trends of the interbank competition development in Russia at the present stage. The severity of the interbank competition concerns not only the largest participants in the banking market but also medium-sized and small banks since the stable functioning of banks determines the efficiency of the country's banking system and the national economy as a whole.

The study of this topic is of great importance both in the theoretical aspect and in the practical one. It is important to distinguish between interbank and banking competition since the pool of competitors is expanding at the expense of non-bank financial institutions. Banks that have the same products and operate in the same market are competitors. At the same time, the primary goal of banks is to attract more customers, increase sales of banking products and, accordingly, increase profits. Consequently, interbank competition is a dynamic process in which banks ensure their stable position in the banking market [1]. Many economists, both foreign and domestic, are studying the interbank competition. The classics of economic theory also paid much attention to this topic. J. Robinson studied "the mechanism of price formation, considering each manufacturer a monopolist" [2]. F. Hayek emphasized a special role of competition "as a way to identify new products, the implementation of which allows you to get high profits, use new markets and ensure the dynamic development of the economy as a whole" [3]. E. Chamberlin has formed a model of the market structure, in which numerous participants are independent of each other and have no restrictions on entering any market sector, while buyers of a number of monopoly products and services purchase them for an increased price [4]. F. Edgeworth investigated the state of perfect competition, in which the number of suppliers of products, services, and their consumers is infinite, and the equilibrium of exchange is certain [5].

Domestic economists O. P. Ovchinnikova, E. A. Dynnikov define competition as a factor of the banking market stability [6]. L. V. Demchenko believes that competition increases the risks of banks [7]. V. G. Sadkov and A. K. Podmaster'eva adjusted the Herfindahl-Hirschman index by the price change index, which made it possible to obtain reliable information about the competition in the banking market [8]. Yu. O. Skorlupina developed methods to adequately assess competition, considering the factors that determine the situation in the banking market [9]. V. M. Kutyin, on the basis of absolute and relative indicators, assigned banks eleven clusters of competitive positions [10]. L. M. Sadykova explores the unification of the competitive conditions of a business competition between financial intermediaries aimed at achieving goals and increasing profits [11].

It should be noted that the legislation of the Russian Federation does not give an unambiguous interpretation of "interbank competition", and the studies of economists do not have a unified approach to this issue. This is due to the fact that interbank competition is a relatively new phenomenon in the economy of our country because, during the Soviet period, industrial banks (Gosbank, Zhilstroibank, Promstroibank, Vnesheconombank, Agroprombank, Vneshtorgbank, Sberbank) functioned in the banking market, which occupied certain market niches and did not compete between themselves.

The Bank of Russia as a mega-regulator interprets competition as the rivalry between financial intermediaries for the consumer of their products and services.

A. M. Tavasiev believes that "interbank competition is a dynamic struggle between credit institutions in the market for deposits, loans, and other banking products, as well as

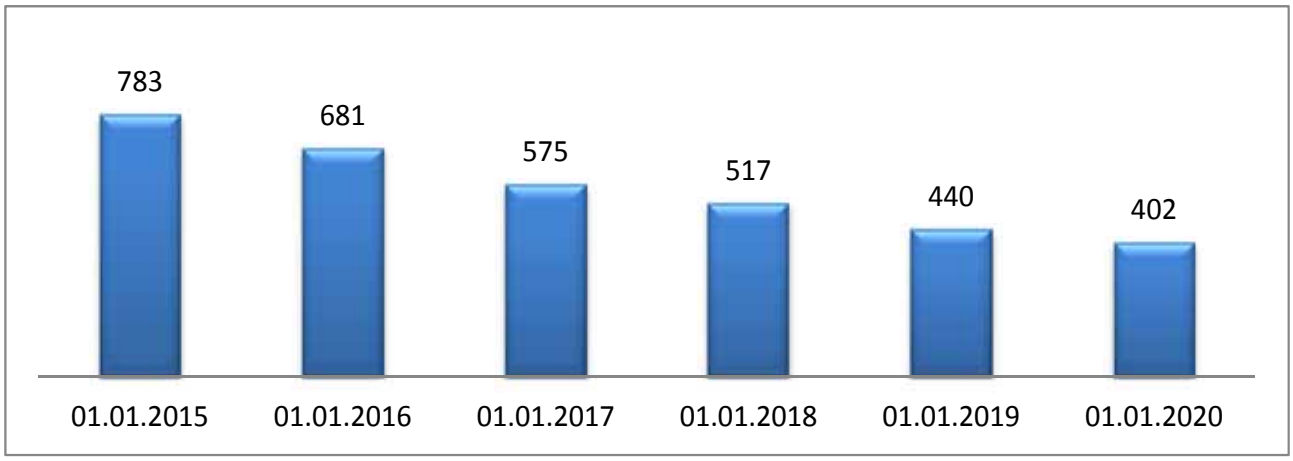

Fig. 1. **Number of banks in Russia, units**

Source: compiled by the authors based on data from the Central Bank. URL: https://cbr.ru/statistics/bbs/statisticheskiy-byulleten-banka-rossii/ (accessed on 04.09.2020).

in alternative financial markets".[1] The same point of view is shared by A. A. Khandruev, A. A. Chumachenko [12]. Moreover, interbank competition contributes to the efficiency of the implementation of banking products and services and their improvement [13].

We understand interbank competition as the functioning of banks in a competitive environment for attractive sources of accumulating resources and their placement, considering the principle of customer focus and with the aim of ensuring their stability in the banking market. The development of the product line of banks ensures the improvement of interbank competition. Based on the author's concept, we will analyze the state of interbank competition in the Russian banking market.

Currently, a stable trend in the development of the Russian banking market is the reduction in the number of banks. For the period 2015–2020 their number decreased by 381 units (*Fig. 1*).

This situation is primarily due to the macroeconomic goal of the Bank of Russia, aimed at "improving the banking market by revoking licenses from financially unstable financial intermediaries implementing risky credit policies and suspicious transactions" [14]. During 2020, the number of banks decreased by another 22 (from 442 to 420), of which 13 banks had their licenses revoked, and 9 were reorganized. The Bank of Russia forecasts the revocation of licenses until 2021 in an amount comparable to 2019 (approximately 30–35 reviews per year).[2] At the same time, the increase in the share of bank reorganizations in recent years (mergers, acquisitions, license waivers) is not negative dynamics due to the fact that the mega-regulator is pursuing a strategy of market contraction. The financial market is characterized by an oligopoly with a competitive environment with a relatively high level of state participation in the capital of financial intermediaries.[3]

By determining the state of interbank competition, it is possible to record the increasing dynamics of a high level of asset concentration. So, as of January 1, 2020, the Top 5 largest banks own about 60% of the total assets of the banking sector, 20 banks — more than 80%, and 200 banks — 99.2% (*Table. 1*).

[1] Tavasiev A. M. Competition in the Russian banking sector: a study guide for universities. A. M. Tavasiev, N. M. Rebel'skii. Ed. A. M. Tavasieva. M.: UNITY-DANA; 2001. 304 p.

[2] Experts expect an acceleration in the revocation of licenses from banks by the end of the year. URL: https://ria.ru/20200824/1576216444.html (accessed on 04.09.2020).

[3] Bank of Russia approaches to developing competition in the financial market. URL: https://www.pc.gov.au/inquiries/completed/financial-system/report/financial-system.pdf (accessed on 04.09.2020).

Table 1

Assets in the banking sector, %

Distribution of credit institutions, ranked by assets (descending)	01.01.2015	01.01.2016	01.01.2017	01.01.2018	01.01.2019	01.01.2020
First 5	53.8	54.1	55.2	55.8	60.4	60.3
6 to 20	20.9	21.6	22.8	23.5	21.2	22.6
21 to 200	22	21.5	19.9	19.2	17.4	16.3
From 201	3.3	2.8	2	1.5	1	0.8
Total	100	100	100	100	100	100

Source: compiled by the authors based on data from the Central Bank. URL: https://cbr.ru/banking_sector/statistics/ (accessed on 04.09.2020).

A significant proportion of these assets belong to the state-owned banks. The trend over the past six years has demonstrated an increase in total assets from 43.9 to 59% and an increase in total capital — from 48.9 to 64.2%.

The impact of the pandemic has undoubtedly slowed banking activity. However, from the second half of 2020, the activity of the economic participants has been observed, which allowed the majority of banks to enter the growth trajectory. An increase in assets is observed in 59% of the banking market participants, including 37 banks from the Top 50 and all representatives of the Top 10.[4] Moreover, the three largest banks with state participation (Sberbank, VTB, Gazprombank) own more than 50% of the total assets of the banking market (*Table. 2*).

The quality of banks' loan portfolios is important for interbank competition. Considering the current economic situation during the pandemic, the Bank of Russia assumes that in the mid-term, the banking sector will see an increase in overdue loans and bad credit debt service. However, the situation can be mitigated by restructuring loans to affected borrowers under the terms of banks' own programs or by granting loan holidays adopted by law. For most of these loans, the Bank of Russia allowed banks to temporarily not build up additional reserves, planning that borrowers will soon return to normal servicing of credit debt.[5]

It should be noted that the share of the leader, Sberbank, is twice the share of its closest competitor, VTB Bank; 7.7 times higher than the share of Alfa-Bank, which occupies the 5th place in the ranking; 23 times higher than the share of Raiffeisenbank, which closes the Top 10 largest banks in terms of assets. We believe that the excessive concentration of assets of the largest systemically important state-owned banks negatively affects the interbank competition. At the same time, there is a loss of investment interest in the banking business in Russia. Obviously, it is difficult to fix the situation by strictly regulating the dominant banks and selling rehabilitated banks to private investors. Large

[4] URL: https://finance.rambler.ru/realty/44766683/?utm_content=finance_media&utm_medium=read_more&utm_source=copylink (accessed on 04.09.2020).

[5] URL: https://cbr.ru/press/pr/?file=10082020_163109pr_0.htm (accessed on 04.09.2020).

Table 2

Top 10 Russian banks in terms of assets, household deposits, loan portfolio and their share as of 01.01.2020

Ranking place	Top 10 banks by assets	Top 10 banks in terms of household deposits	Top 10 banks in terms of loan portfolio
1	Sberbank (29.9%)	Sberbank (43.6%)	Sberbank (35.1%)
2	VTB (15.2%)	VTB (14.1%)	VTB (17.8%)
3	Gazprombank (7.1%)	Alfa-Bank (3.9%)	Gazprombank (8%)
4	National Clearing Centre (4.2%)	RusAg (3.8%)	RusAg (4.2%)
5	Alfa-Bank (3.9%)	Gazprombank (3.8%)	Alfa-Bank (4.1%)
6	RusAg (3.7%)	Otkritie Bank (2.9%)	MKB (3.4%)
7	Otkritie Bank (2.8%)	MKB (1.6%)	Otkritie Bank (2.4%)
8	MKB (2.6%)	Raiffeisenbank (1.5%)	National Clearing Centre (2%)
9	NB Trust Bank (1.4%)	Sovkombank (1.4%)	NB Trust Bank (1.6%)
10	Raiffeisenbank (1.3%)	Post Bank (1.3%)	Raiffeisenbank (1.4%)

Source: compiled by the authors based on data from Banki.ru. URL: https://www.banki.ru/banks/ratings/?source=submenu_banksratings (accessed on 04.09.2020).

banks with state participation in the capital are currently important trendsetters[6] and main active players in the market.

In the deposit market, more than 40% of individual deposits are also concentrated in Sberbank; the share of VTB Bank (14.1%) is 3 times less than the share of the leader; the shares of other banks from the Top 10 are less than 4%. This situation has a negative impact on the intensity of interbank competition in this segment of the banking market.

As of January 1, 2020, the deposit accounts of the Top 5 banks accounted for 66.5% of the total amount of funds attracted from legal entities and individuals (compared to 65.5% in 2019), the Top 50 banks attracted 92.1% customer funds (2019–91.2%), and the Top 100 banks have accumulated — 95.8% (2019–95.6%).[7] A slight decrease of deposits in mid-2020 is associated with the priority of depositors to purchase everyday goods during the pandemic, as well as the fact that they made purchases "to have in store", fearing an increase in prices.

It should be noted that large banks offer their depositors deposits at a lower interest rate, in contrast to small regional banks. In this case, depositors are guided by the status of the bank's reliability, guarantee, and reputation, rather than the possibility of earning more income. This fact reduces the level of interbank competition.

One of the sectors of the financial market where interbank competition is actively manifested is the payment market. The reason for this is the steady trend of a drop in the share of the cash in circulation and the rapid growth in the issue of payment cards and the volume of transactions with their use. According to the statistics of the Bank of Russia, each citizen of the country has up to three bank cards, one of which is "Mir". The share of payments by bank cards has already reached 60%; at the same time, the ratio of the volume of payments by cards to the amount of cash withdrawn is more than 80% (compared

[6] Banks.ru Financial supermarket. Banking Sector Review 2019. URL: https://static2.banki.ru/ugc/ba/58/70/d0/bank-obzor-2019-dl_-publikacii.pdf (accessed on 04.09.2020).

[7] See previous.

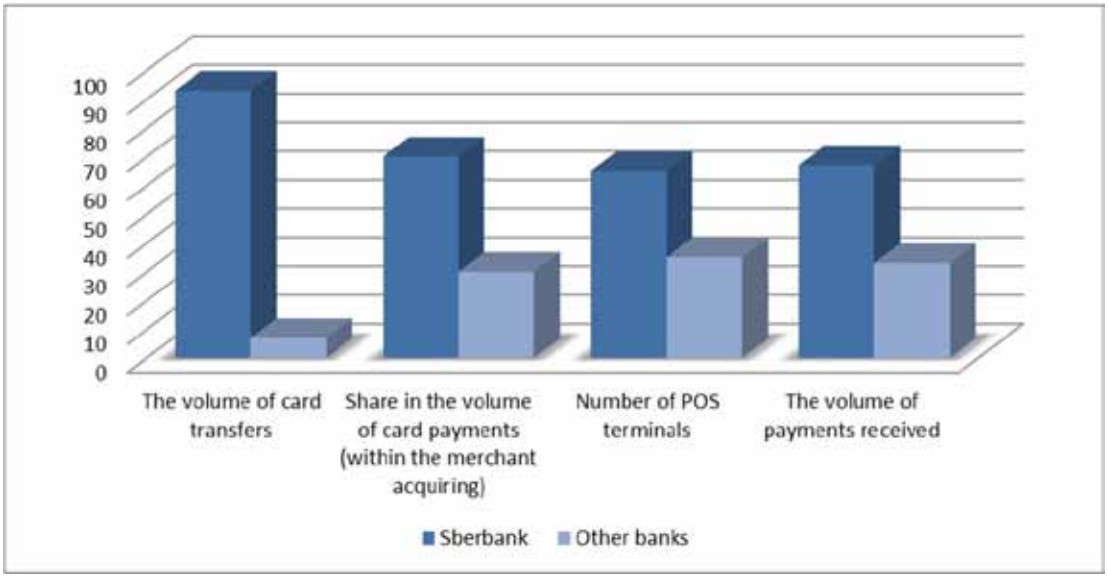

Fig. 2. **Share of banks in the volume of card transfers, %**

Source: compiled by the authors based on data from the Central Bank. URL: https://cbr.ru/Content/Document/File/90556/Consultation_Paper_191125.pdf/ (accessed on 04.09.2020).

to 2015 — 38% and in 2010 — 12%).[8] At the same time, domestic banks are innovation leaders in the field of cashless payments (Mir Pay, Apple Pay, Samsung Pay). Considering the peculiarities of the payment system, interbank competition is observed between issuing banks for a customer — cardholder and acquiring banks for merchant services (*Fig. 2*).

Fig. 2 presents Sberbank's noticeable leadership in the market of non-cash payments and transfers. First of all, this is provided by the issue of debit cards for "salary projects". The merchant acquiring niche is occupied by about 140 banks, but Sberbank still holds the lion's share in terms of the number of electronic terminals and in terms of the volume of payments made. Thus, there is a classic monopoly of Sberbank in this segment of the market, where other banks have no opportunity to compete.

So, Sberbank is the leader in the payment, deposit, credit, and other sectors of the financial market. The share of its loan portfolio reached 35.1%. VTB's loan portfolio is half the size (17.8%) and Gazprombank (8%) is significantly inferior to it.[9] The intensity of interbank competition in the credit market is stronger than in the deposit market. However, Sberbank is the undisputed monopolist of the market.

Thus, the backbone of the Russian banking market is state-controlled banks [15]. Anti-crisis measures implemented in 2008–2009 helped to strengthen the monopoly of state banks. Undoubtedly, large banks provided significant support to the population, entrepreneurs, small and medium-sized businesses during self-isolation in 2020. It is easier for large state banks to cope with crises in the financial market. The advantages of the state-owned banks in the market are the stability of the country's banking system, the provision of benefits to bank customers, low interest rates on loan products, profitable savings programs. However, a significant drawback of the prevalence of banks with state participation in the country is the decrease in interbank competition. It is important to consider that if the mega-regulator decides to reduce the share of the state in the capital

[8] URL: https://cbr.ru/Content/Document/File/90556/Consultation_Paper_191125.pdf/ (accessed on 04.09.2020).

[9] URL:https://www.banki.ru/banks/ratings/?source=submenu_banksratings (accessed on 04.09.2020).

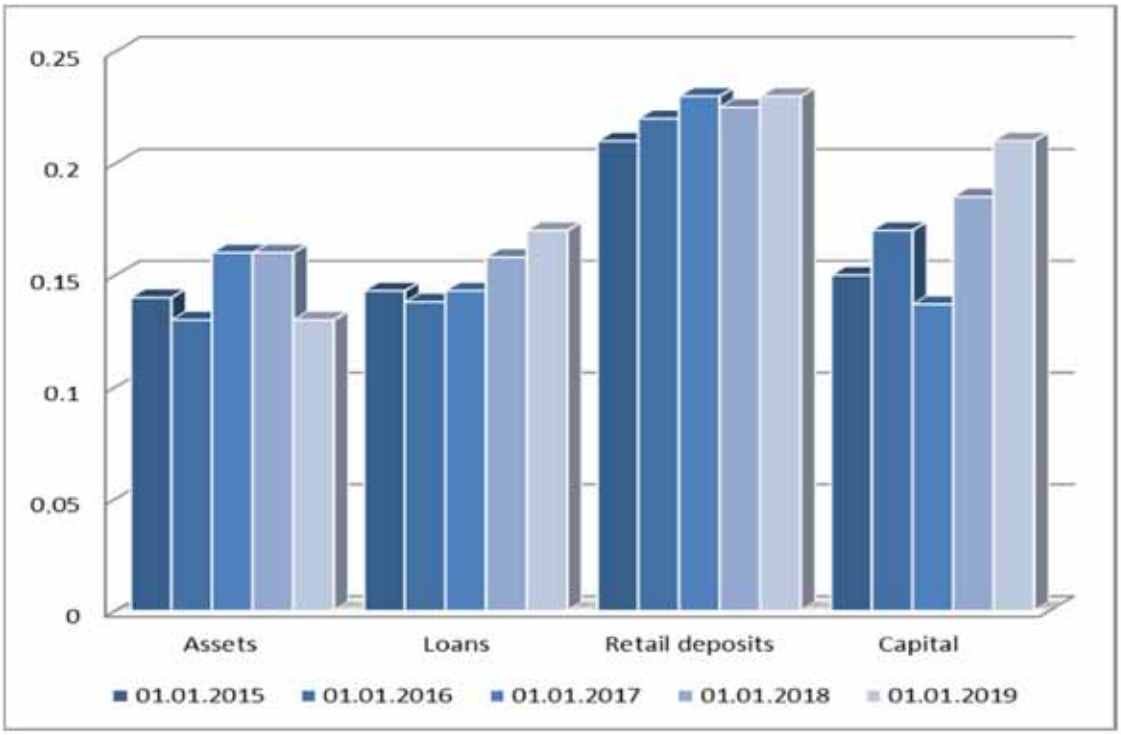

Fig. 3. **Values of the Herfindahl-Hirschman index for the main indicators of the banking sector**

Source: compiled by the authors based on data from the Central Bank. URL: https://cbr.ru/publ/nadzor/ (accessed on 04.09.2020).

of banks in order to develop the interbank competition, customers may lose confidence in private institutions, as they do not provide an additional guarantee for the safety of their funds. Especially, if the bank is the only supplier of financial products in a small remote region of the country, then not only trust but also the availability of financial services for consumers becomes an issue.

To determine the level of interbank competition, let us analyze the dynamics of the Herfindahl-Hirschman index (*Fig. 3*) by indicators: assets, equity, deposits of individuals, loans, and other placed funds provided to non-financial resident organizations. The Herfindahl-Hirschman Index (HHI) considers both the number of credit institutions and the inequality of their position in the banking market and characterizes the level of monopolization. The value of HHI decreases with an increase in the number of credit institutions and increases with increasing inequality between them for any number of them.

The tendency of increasing the concentration of the banking sector in all four indicators is clearly visible. In terms of assets and loans, HHI has changed insignificantly over the past 5 years and corresponds to the value of the moderately concentrated banking market. This is characterized by the fact that, despite the dynamic revocation of licenses, the banking sector has a fairly large number of credit institutions.

At the end of 2017, the value of HHI by capital moved to a zone of high concentration, and in 2018 there was a sharp increase to 0.21. At the end of 2019, a small number of banks had capital gains, and in 2020 — only 59.7% of banks. This dynamic of increasing the capital base of banks is the worst result over the past 10 years. The reason for the low capitalization is the weak growth in the profitability of the banking business. Sberbank (RUB 300 billion, 7%) was among the leaders in terms of absolute bank capital growth over the past year, VTB Bank ranked second (RUB 82 billion).[10]

[10] Largest banks in terms of equity capital as of January 1, 2020. URL: https://riarating.ru/banks/20200304/630157179.html (accessed on 04.09.2020).

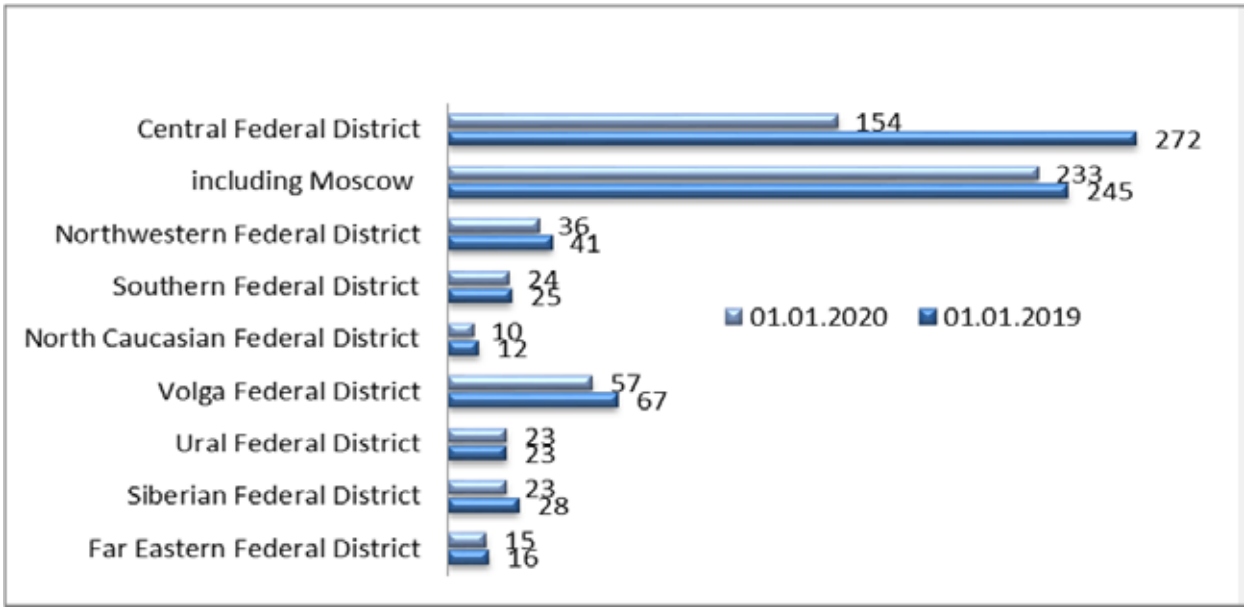

Fig. 4. **Distribution of credit institutions in Russia as of 01.01.2019–01.01.2020**

Source: compiled by the authors based on data from the Central Bank. URL: https://cbr.ru/statistics/bank_system_new/cr_inst_branch_010118/ (accessed on 04.09.2020).

The highest value of HHI is observed in the deposit market. After a slight decline in 2017, in 2018 HHI reached an all-time high of 0.23.[11] The study of the deposit market demonstrates a monopoly position in the market of Sberbank (40–50% of all deposits) due to the location of its multi-branch structure throughout the country; availability of banking products and services for all segments of the population, as well as customer focus on business. Consequently, the segment of household deposits is characterized as a market with a high level of concentration. Thus, all the above values of the Herfindahl-Hirschman index confirm the earlier conclusions about the high concentration of the Russian banking market [16].

In our opinion, it is difficult to give an accurate assessment of interbank competition, since a number of the largest banks have a strong influence on the banking market; and the remaining insignificant market share is under strong competition from small and medium-sized banks. Many banks are trying to diversify their product line, soften the conditions for the customer, and make their products and services more attractive.

The analysis of the state of interbank competition is complicated by the fact that:

- the same bank can be both a leader and an outsider in different regions of the country, depending on the bank competitor;
- the interbank competition in all segments of the banking market depends on the economic situation in the country, which increases the risks of the unpredictability of changes occurring outside the banking market.

The interbank competition must be analyzed from the perspective of the activities of each bank in a particular region to generate the most reliable information about it.

We agree with the opinion of A. M. Shaposhnikov on the importance of assessing the competitiveness of regional banks in the context of interbank competition [17]. The use of the index of the integral competitiveness of regional banks will increase their importance in the market. An important competitive advantage of regional

[11] Development of Competition in the Financial Market: Russia and International Practice. Analytical materials. XVI International Banking Forum "Banks of Russia — XXI Century". Sochi, 2018. URL: https://asros.ru/upload/iblock/af3/18061_analiticheskiematerialysochi2018.pdf (accessed on 04.09.2020).

banks is personal relationships with clients, understanding the needs of small and medium-sized regional businesses. However, the weaknesses of regional banks reduce their competitiveness: low capital, limited branch network, inaccessibility of banking innovations, lack of qualified personnel. Regional banks in the context of interbank competition should pay careful attention to internal and external factors, expand their product line, focusing on customer needs, determine price parameters, predict long-term goals and develop a strategy for achieving them. Large banks, on the contrary, redistribute monetary resources not in favor of the regions, since they do not consider the interests of the region and have their offices in the central federal districts of the country.

Geography has a huge impact on interbank competition. In the regions of Russia, due to the unequal level of their economic development, there is an uneven distribution of banks (*Fig. 4*). Systemically important large banks operate in the developed regions of the country. In remote territories of Russia, customers experience the insufficient provision of banking services and a low level of interbank competition [18].

According to the statistics of the Bank of Russia,[12] the share of the Central Federal District (Moscow and the Moscow Region) is 52.5% of the banking market, while the regions account for 3.4% (in the Far Eastern Federal District) to 12.9% of banks (in the Volga Federal District). The geographical factor emphasizes the urgency of organizing an effective mechanism for regulating interbank competition aimed at the development of each region [19].

Thus, in Russia there is a steady trend of scaling the territorial presence of large banks in the regions, reducing the share of the regional market and the effective functioning of regional banks.

It should also be noted that the presence of foreign banks in the banking market influences interbank competition. A number of factors (high macroeconomic risks, increased influence of banks with state participation, changes in the country's foreign policy situation, intensification of the processes of mergers and acquisitions of credit institutions) contributed to the decrease in the number of foreign banks, the closure of their branches and the outflow of foreign capital from the country. Thus, according to the Central Bank of the Russian Federation, for the period from January 1, 2015 to January 1, 2020, the share of non-residents in the total authorized capital of operating credit institutions decreased by half (from 26.42 to 13.9%)[13] [11]. And it should be noted that during the analyzed period the share of operating credit institutions with the participation of non-residents increased from 28 to 32% [11]. The largest banks with foreign capital (UniCredit, Raiffeisenbank, Citibank, Rosbank) are included in the Top 20 credit institutions in Russia, they operate successfully and actively compete with state banks in key segments of the banking market. The presence of foreign credit institutions intensifies the interbank competition in Russia.

Signs of improvement of the interbank competition can be considered the introduction of innovation in the banking business, the emergence of new customer-oriented products and an individual approach to customer service, an increase in the quality of service, an increase in the speed of service provision, ensuring accessibility and simplicity.

To determine the state of interbank competition, in our opinion, it is necessary to consider the quality and degree of customer focus of banking services and products. The applied impression index is based on such criteria as how the bank's products correspond to the client's needs, the

[12] URL: https://cbr.ru/statistics/bank_system_new/cr_inst_branch_010118/ (accessed on 04.09.2020).

[13] Information about operating credit institutions with the participation of non-residents. Bank of Russia. URL: https://cbr.ru/analytics/bank_system/PUB_130701/ (accessed on 04.09.2020).

Table 3

Advantages and disadvantages of top 5 Russian banks according to the level of the Customer Experience Index

Bank	Advantages	Disadvantages
Sberbank	Quick to introduce modern technologies, friendly and attentive staff	Modern technologies are rarely used in branches of remote regions
VTB-24	High level of bank reliability, client-oriented business, convenient office locations	The value of its balance sheets is inferior to the leader of Sberbank
Alfa-Bank	Customer-oriented approach, friendly service	The bank has slowed down innovation activity and is inferior in some positions to its competitors
Home Credit	High-quality work, customer focus	Does not have large deposits due to lack of trust from depositors
Raiffeisenbank	Convenient branches, efficient sales of "boxed" products	Overpriced

Source: Russian banks are making the best possible impression on customers. URL: http://www.plusworld.ru/daily/rossiyskie-banki-proizvodyat-vse-luchshee-vpechatlenie-na-klientov/ (accessed on 15.04.2020).

availability and simplicity of service points, the communication of bank personnel with the client, the attractiveness of the brand, the effectiveness of advertising.[14]

It is very important for bank managers to monitor the mood of clients and conduct their behavioral segmentation. At the same time, consumer demand management must be carried out not only before and during the sale but also after transactions. Obviously, after poor service at the bank, customers will share their opinions, spreading a negative impression. Therefore, managers must respond quickly to all customer feedback and create a positive customer experience. Currently, a multi-channel factor has formed, which cannot be ignored. Multichannel, in our understanding, is a combination of online and offline tools for the effective organization of a communication system with the bank's customers. Statistics show that customers aged 55–64 prefer to ask questions of interest by phone (for example, the bank's hotline), while the younger generation of 16–24-year-old customers of the bank will use the Internet.[15] It is also necessary to consider the gender of clients since women and men do not receive information in the same way. So, women prefer personal communication with bank employees or call by phone for advice; and men give preference to personal opinion, solve the problem on their own, they need initial information. Consequently, successful customer service, a clear presentation of the demographic portrait of the audience, and preferred points of communication are important for increasing interbank competition.

Thus, Russian banks must constantly monitor customer satisfaction while servicing and providing products (services). To increase interbank competition, it is recommended that banks implement systematic monitoring of customer satisfaction on a quarterly basis. Its introduction into the bank's management system will increase the loyalty of the target audience and implement effective management. All this will ensure long-term relationships between the bank and its customers and will increase trust in a bank.

[14] Rudskaya E.N. Customer experience as a tool for the competitiveness of commercial banks. Young scientist. 2016;(11):937–948. URL: https://moluch.ru/archive/115/30407/ (accessed on 04.09.2020).

[15] URL: https://finance.rambler.ru/money/38073067-issledovanie-bankovskie-klienty-stanovyatsya-distantsionnee-i-molozhe/?article_index=1 (accessed on 04.09.2020).

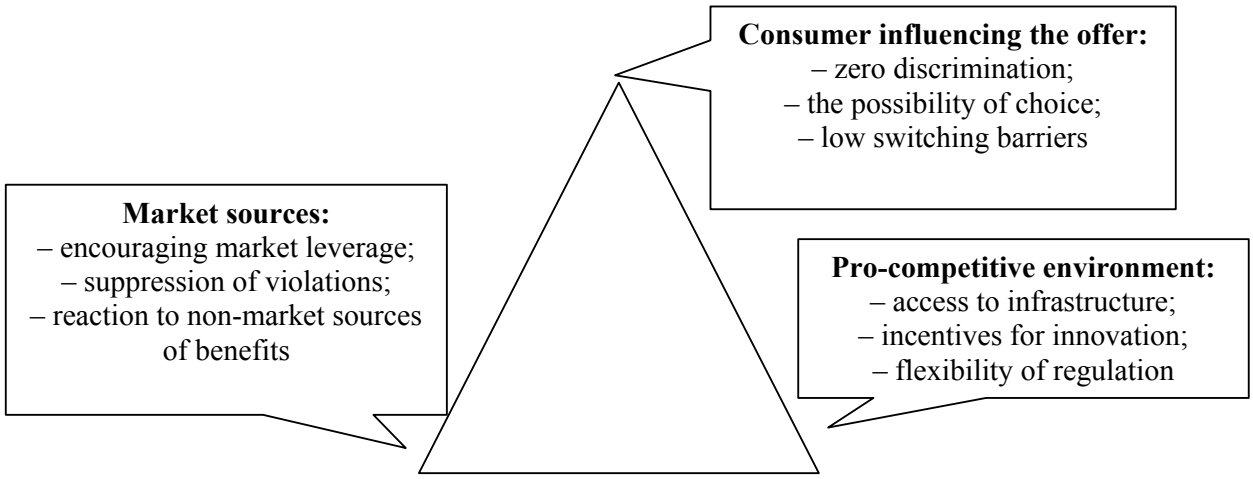

Fig. 5. **Targets for interbank competition**

Source: compiled by the authors based on data from the Central Bank. URL: http://www.cbr.ru/content/document/file/90556/consultation_paper_191125.pdf (accessed on 04.09.2020).

In a volatile market, banks need to ensure their financial stability. Numerous risks negatively affect the stability of banks. The most vulnerable banks may be banks of narrow specialization with low-quality risk management, with high dependence of business on one segment of the banking market, on the weak economic development of a region or industry. Currently, the problem of imperfect risk management systems and ensuring the financial stability of banks has become aggravated. In our opinion, the red line marks the issue of risk management in the context of interbank competition. Much attention should be paid to risk management not only in each specific bank but also on the part of the mega-regulator in relation to the entire market. Increased risks of one bank can lead to losses, up to its bankruptcy and liquidation. The impact of systemic risks on the activities of banks can upset the balance in the entire banking system. Banks should prioritize the development of risk management practices.

The main ones are:

- reservation — formation of a reserve to cover unforeseen expenses;
- insurance — the creation of an insurance fund of resources to compensate for damage from unforeseen risks;
- hedging is used to minimize possible investment losses due to market risk;
- distribution of the degree of risk (indexing the cost of services, provision of guarantees, property pledge, a system of penalties);
- diversification of assets;
- avoiding risks by completely rejecting specific transactions by the bank;
- minimizing risks by managing assets and liabilities.[16]

Formed trends in the development of the banking market: monopolization, centralization, the concentration of capital, federalization, globalization — hinder the effective development of the banking business and the economy as a whole. We consider it expedient to set the task for the Bank of Russia to provide conditions for a healthy competitive environment and strong interbank competition. It is a fair competition that will make it possible to carry out qualitative changes in the banking business aimed at increasing the efficiency of banks' activities. In our opinion, to achieve this goal it is necessary:

1) to reduce the degree of state participation in the formation of banks' capital by establishing standards for the admissible state

[16] Competition in the financial market. Analytical report. Bank of Russia. 2018. URL: https://cbr.ru/StaticHtml/File/41186/20180607_report.pdf (accessed on 04.09.2020).

participation in the authorized capital of credit institutions;[17]

2) establish equal "rules of the game" for all participants in the banking market and exclude state privileges;

3) not to mention the participation of the state in the authorized capital of a credit institution in advertising of banking products and services;

4) upgrade the mechanism of proportional regulation of banks, namely, to promote the development of regional small and medium banks through the provision of tax and financial incentives; stimulate the development of new banking products; "legislate the priority of the participation of regional banks in servicing the investment programs of the region", etc. [19];[18]

5) introduce measures to reduce unfair interbank competition and corruption in the banking market;

6) to promote "the formation of non-price competition to increase the attractiveness of credit institutions"[19] and the development of digital financial infrastructure.

In turn, measures to increase interbank competition cannot run counter to the rest of the development of the banking sector. When approving the policy for the development of interbank competition, the Bank of Russia adheres to the goals of ensuring financial stability, establishing trust in the financial market, and the availability of banking products and services.

However, the goals to increase interbank competition often contradict the goals of stabilizing the banking sector. As a result of interbank competition, weak ineffective players leave the market. Nevertheless, leaving the market of a major player leads to an imbalance in the banking system and can cause a "domino effect" that threatens with high costs. When goals are comparable, it will contribute to the sustainable development of the financial market as a whole.

Implementation of relevant measures in the above areas will improve the state of interbank competition in the banking market.

The primary task of stabilizing the state of interbank competition is to minimize the risks of the banking sector. The Bank of Russia sets out targets for interbank competition.[20] *Fig. 5* presents a "triangle of target" showing banks' productive activities and anticipated reactions to market developments.

We believe that in order to reduce risk, banks should maintain an optimal balance in the following areas.

First, the offering of products and services should be driven by customer preferences, as they are the driving force behind the competition.

Second, interbank competition should be market-based and encourage banks to compete with each other. Focusing only on non-market factors and privileges for some banks increases the risk of unfairness and negates the incentives to expand the banking business.

Third, expanding the access of small and medium-sized banks to new financial technologies, platform solutions, and outsourcing.

CONCLUSIONS

Thus, as a result of the study, the authors understand interbank competition as the process of banks' functioning in a competitive environment for attractive sources of accumulating resources and their placement, considering the principle of customer focus and the goal of ensuring their stability in the banking market. The authors' clarification of the concept

[17] Through direct or indirect acquisition or long-term retention of shares by the state (stakes in the authorized capital) of credit institutions.

[18] Impact of banking sector rehabilitation policies on competition and sustainability. Economic Research Report Series. Bank of Russia. 2017. URL: https://cbr.ru/Content/Document/File/16717/wp_22.pdf (accessed on 04.09.2020).

[19] Competition in the financial market. The analytical report was prepared by the Bank of Russia with the participation of the FAS Russia for the XXVII International Financial Congress. Bank of Russia. 2018. URL: https://www.cbr.ru/Content/Document/File/44303/20180607_report.pdf (accessed on 04.09.2020).

[20] Bank of Russia approaches to developing competition in the financial market. URL: https://cbr.ru/Content/Document/File/90556/Consultation_Paper_191125.pdf (accessed on 04.09.2020).

of interbank competition emphasizes their contribution to the development of theoretical science.

Interbank competition develops depending on the degree of improvement of the product line of banks. The analysis of the current state of interbank competition reflects a steady decline in the number of banks, mainly due to the revocation of licenses from financially unstable institutions. However, with a decrease in the number of participants in the banking market, an increasing dynamic of a high level of concentration of banks' assets was revealed. At the same time, the Top 5 banks in Russia form about 60% of the total assets of the banking sector (loans, investments, etc.). A similar situation is observed in the deposit market and the market for non-cash payments. Sberbank, VTB, Gazprombank, Alfa-Bank play a dominant role in the market. The Herfindahl-Hirschman Index demonstrates the sufficient importance of credit institutions in the banking sector, despite the dynamic revocation of licenses. The authors emphasize the dependence of the banking market on the activities of the largest state-owned banks. At the same time, the competition between small and medium-sized banks intensifies as they are expanding their product line and increasing their attractiveness. The factor of the geographical location of banks is of great importance. Large banks operate in the developed regions of the country, while there are no sufficient banking services in remote territories. It is worth noting the importance of the presence of the largest banks with foreign capital on the Russian market (UniCredit, Raiffeisenbank, Citibank, Rosbank) since they make up the Top 20 credit institutions in Russia. The presence of foreign credit institutions intensifies the interbank competition in Russia.

We believe that to increase interbank competition, bank managers need to pay attention to successful customer service, a clear presentation of the demographic profile of the target audience, and preferred points of communication. It is necessary to constantly monitor the quality of customer service and the provision of banking products (services) to them. To increase interbank competition, it is recommended that banks carry out systematic monitoring of customer satisfaction on a quarterly basis.

We believe that in a volatile market, a special place in banking management should be given to risk management. The increased risks of one bank due to the "domino effect" can destabilize the entire banking system. We recommend that the mega-regulator implement measures to minimize the risks of banks and provide conditions for the formation of a healthy competitive environment. The Bank of Russia, when developing a policy for the development of interbank competition, should focus on ensuring financial stability, establishing confidence in the financial market, and the availability of banking products and services.

Thus, the author's contribution to the development of practical science consists of identifying the factors that determine interbank competition; as well as the development of recommendations for the mega-regulator aimed at strengthening interbank competition.

REFERENCES

1. Porter M.E. Competitive strategy: Techniques for analyzing industries and competitors. New York: Free Press; 1998. 397 p. (Russ. ed.: Porter M. Konkurentnaya strategiya: Metodika analiza otrasley i konkurentov. Moscow: Alpina Publisher; 2012. 454 p.).
2. Robinson J. The economics of imperfect competition. New York: St. Martin's Press; 1969. 352 p. (Russ. ed.: Robinson J. Ekonomicheskaya teoriya nesovershennoi konkurentsii. Moscow: Progress; 1986. 472 p.).
3. Hayek F.A. Prices and production and other works. Auburn, AL: Ludwig von Mises Institute, 1931. 564 p. (Russ. ed.: Hayek F.A. Tseny i proizvodstvo. Chelyabinsk: Sotsium; 2008. 199 p.).
4. Chamberlin E.H. Theory of monopolistic competition. Cambridge: Harvard University Press; 1933. 213 p. (Russ. ed.: Chamberlin E.H. Teoriya monopolisticheskoi konkurentsii. Moscow: Ekonomika; 1996. 350 p.).

5. Edgeworth F. Y. Mathematical psychics: An essay on the application of mathematics to the moral sciences. London: C. Kegan Paul and Co.; 1881. 150 p.
6. Ovchinnikova O., Dynnikov E.A., Ovchinnikova N.E. Improving the mechanism for regulating the stability of the banking system. *Finansy i kredit = Finance and Credit*. 2011;(17):8–15. (In Russ.).
7. Demchenko L.V. Competition as a macroeconomic factor of stability of the banking system. *Vestnik Orenburgskogo gosudarstvennogo universiteta = Orenburg State University Vestnik*. 2006;(2–1):145–150. (In Russ.).
8. Sadkov V.G., Podmaster'eva A.K. Competition in financial markets: State, problems, methods of regulation. *Finansy i kredit = Finance and Credit*. 2008;(6):2–11. (In Russ.).
9. Skorlupina Yu.O. Methods to assess the inter-bank competition in the Russian banking market. *Finansovaya analitika: problemy i resheniya = Financial Analytics: Science and Experience*. 2015;(5):53–62. (In Russ.).
10. Kutyin V.M. Building a map of strategic competition in the banking sector. *Marketing uslug*. 2011;(3):194–216. (In Russ.).
11. Donetskova O. Yu., Sadykova L.M. Modern features of the competitive environment in banking business. *Azimut nauchnykh issledovaniy: ekonomika i upravleniye = ASR: Economics and Management (Azimuth of Scientific Research)*. 2018;7(3):83–86. (In Russ.).
12. Khandruev A.A., Chumachenko A.A. Competitive environment and modernization of the structure of the Russian banking sector. *Bankovskoe delo = Banking*. 2010;(11):6–13. (In Russ.).
13. Bondareva Yu., Shovikov S., Khairov R. Competition in the banking services market. *Bankovskoe delo = Banking*. 2004;(1):9–14. (In Russ.).
14. Shelkunova T.G., Gagloeva K.A. Banking competition and competitiveness: Essence, concept, specificity. In: Problems and prospects of economics and management. Proc. 3rd Int. sci. conf. (St. Petersburg, Dec. 2014). St. Petersburg: Zanevskaya ploshchad'; 2014:141–145. (In Russ.).
15. Osipovskaya A.V. Features of competition in the Russian market of banking services. *Molodoi uchenyi = Young Scientist*. 2018;(51):259–262. (In Russ.).
16. Buchkova A.A. Competition in the banking sector. *Nauka-Rastudent.ru*. 2016;(3):4. (In Russ.).
17. Shaposhnikov A.M. Interbank competition and assessment of the competitiveness of commercial banks. Cheboksary: Sreda; 2020. 128 p. (In Russ.).
18. Widerker N.V., Tsoneva E. Yu. Interbank competition as a factor in improving the quality of banking services. *Mezhdunarodnyi zhurnal gumanitarnykh i estestvennykh nauk = International Journal of Humanities and Natural Sciences*. 2017;(3–2):104–107. (In Russ.).
19. Aliev I.A. Competitive environment in the Russian banking system. *ETAP: ekonomicheskaya teoriya, analiz, praktika = ETAP: Economic Theory, Analysis, and Practice*. 2017;(5):92–100. (In Russ.).
20. Malakhov I.O., Timerkhanov R. Sh. Problems of competitiveness of regional banks. *Vesti nauchnykh dostizhenii. Ekonomika i pravo*. 2020;(3):116–119. (In Russ.).

ABOUT THE AUTHOR

Ol'ga Yu. Donetskova — Cand. Sci (Econ.), Assoc. Prof., Department of Banking and Insurance, Orenburg State University, Orenburg, Russia
olja-ja-77@mail.ru

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