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Ups and Downs of Business Activity in the Waves of Crises, the Coronavirus Pandemic and Unprecedented Western Sanctions

A.A. Frenkel, B.I. Tikhomirov, A.A. Surkov
Institute of Economics, Russian Academy of Sciences, Moscow, Russia

ABSTRACT

Subject of article — the dynamics of the integrated Business Activity Index of the Institute of Economics of the Russian Academy of Sciences in 10 main areas of the national economy and the Index of output of goods and services by basic types of economic activity of Rosstat (Rosstat Index) from 2018 to July 2022 inclusive. Growth factors and a list of key macro indicators that determine the level of business activity in the relevant sectors of the economy, as well as the results of calculating the weights of these sectors, are considered.

The **aim of the article** is to substantiate the advantages of the methodology for constructing the IE RAS Index, which includes development indicators of 10 areas of the national economy, in comparison with the Rosstat Index. Theoretical studies are based on practical calculations performed on the basis of official statistical reporting, and a comparative analysis of the results with the dynamics of the Rosstat Index. Research period: post-crisis 2018–2019, pandemic and post-pandemic 2020–2021 and initial stage of the mobilization period for the economy — January-July 2022**.** To calculate the IE RAS Index, the **method** of construction of integral estimates of macroeconomic dynamics, correlation analysis, as well as a matrix of coefficients of pair correlation for determination of index weights are used, which is a convincing justification of scientific novelty of the proposed methodology of construction and practical use of the IE RAS Index. Based on a comparative analysis of the dynamics of the indices, it was found that the maximum drop in the IE RAS Index and the Rosstat Index was observed in 2020, and the maximum growth was observed in the post-pandemic 2021. Moreover, according to the IE RAS methodology, larger parameters and earlier dates for the start of decline and growth of business activity in comparison with the Rosstat Index were recorded. As a **result**, new convincing evidence of the advantages of the IE RAS Index was obtained, the main of which is a more reliable and accurate determination of the critical moments of a change in the business activity trend and, accordingly, the timing of the onset and overcoming of crisis processes in socio-economic development. The authors **conclude** that, in the new geopolitical reality, it is necessary to include the IE RAS Index as a target indicator for the country's ability to secure state sovereignty.

Keywords: business activity; national economy; mobilization economy; macroeconomic dynamics; economic growth; fixed capital investment; IE RAS Index; Rosstat Index

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INTRODUCTION

Considered in the article the time period from January 2018 to July 2022 is characterized by high turbulence of strategic development, which requires the choice and use in public administration of new instruments for economic growth and social progress.

One of these tools, the importance of which is constantly increasing, becomes business activity, dynamics of which in the period also did not have sufficient stability, especially in the conditions of coronavirus pandemic and unprecedented western sanctions after the start of the special military operation in Donbas and Ukraine (SMO).

The index of business activity has a long history [1] and today there are many approaches to its definition both abroad [2–4], and in Russia [5–7].

An example of such an index in current practice is the Rosstat Index. The index is formed monthly on the basis of data of dynamics of mining volumes, manufacturing industries, production and distribution of electricity, gas and water, production of agricultural products, construction, transport, and also volume of retail and wholesale trade. However, the Rosstat Index is still incomplete, as a number of areas of the national economy with a significant impact on the volume and dynamics of value added and, consequently, GDP are not included.

Quite competitive and efficient methodical tools of construction of index of business activity can be considered "Economic activity aggregate" — Index published by the Centre for Macroeconomic Analysis and Short-term Forecasting (CMASF).[1] The CMASF aggregate is based on the formation and analysis of indicators of the dynamics of the value added of goods and services in a wider range of economic activities compared to the Rosstat Index. In particular, it includes, in addition to basic economic activities, paid services to the population, which allows estimate fully influence on the economic growth of the consumer sector.

In Russian practice, in addition to the construction of these indices, there are a number of approaches to the measure of business activity based mainly on the analysis of respondents' surveys. Since 2001 "Russian Economic Barometer" is published quarterly by Primakov National Research Institute of World Economy and International Relations, Russian Academy of Sciences (IMEMO RAS).

IMEMO RAS publications give the results of regular surveys of industrial and agricultural enterprises and other market economy subjects. However, specific methodological tools and calculations of dynamics indices of business activity are not given.

Centre for Business Tendency Studies of the National Research University "Higher School of Economics" (HSE) is published quarterly the Index of Economic Sentiment (IES HSE).[2] The index allows to promptly evaluate the business climate based on the heads of organizations assessments' of the basic sectors of the economy. IES HSE is based on the answers of the respondents.

Bank of Russia publishes "News index of business activity".[3] The index is based on recurrent economic news to measure economic activity in the country and is essentially based on an artificial intelligence platform. So, the most common economic terms in the news are estimated on the relevance to the economic topic and the semantic color, and then combined into an integral index by highlighting the general trend by method the main components.

In addition to domestic developments, global indicators are used to measure business activity. Quite often in this regard, the Purchasing Managers Index (PMI) is used to

[1] Analysis of macroeconomic trends. Analytical review. October 2022. URL: http://www.forecast.ru/_ARCHIVE/Mon_MK/2022/macro32.pdf (accessed on 12.12.2022).

[2] The index of economic sentiment (IES HSE). URL: https://www.hse.ru/monitoring/buscl/ (accessed on 12.12.2022).

[3] News index estimate in October 2022. URL: https://www.cbr.ru/Collection/Collection/File/43441/index_2210.pdf (accessed on 12.12.2022).

measure business activity in Russia through a system of indicators that characterize the state and development of production or services [8, 9]. PMI is based on surveys of business managers and is likely to be of an evaluative.

From the research of the various existing business indices, it can be concluded that in most cases they do not include the necessary information on the macroeconomic development of the national economy. Moreover, most of them are based only on expert assessments.

In this regard, the IE RAS is proposed to implement the formation of an integral Index of business activity by the main spheres of the national economy (IE RAS Index), taking into account the influence of key industries and spheres of life, especially basic sectors of the real economy, social, monetary, financial and consumer spheres.

As our calculations have shown, the IE RAS Index gives a more reliable and accurate definition of the critical moments of the change in the business trend and, accordingly, the timing of the onset and overcoming of the crisis in socio-economic development in comparison with the Index of output of goods and services by basic types of economic activity of Rosstat (Rosstat index).

The proposed scientifically based, proven on real statistical data method allows to draw a conclusion about the need to include measuring instruments of level of business activity in the target indicators that determine the ability of the country to ensure State sovereignty.

METHODICAL BASES FOR SELECTING AND FORMING INDICES OF BUSINESS ACTIVITY

Issues of countering that announced Russia's unprecedented sanctions of the collective West have become a priority in today's geopolitical reality.

To increase the effectiveness of this process, it is necessary to move to a model of management of strategic development, the basis of which should be formulated by the President of the Russian Federation at the Petersburg International Economic Forum principles and priorities of the State social-economic policy. This will require the development and use of new strategic planning tools.[4]

Of all indices and indicators measuring the efficiency of public administration of the economy, the most prominent is the index of business activity, that to describe the expectation of future economic developments [10].

The central place among these instruments should belong to the integral indicator of the level of business activity of business, the State and the population, including all main spheres of the national economy. First of all, this applies to the productive and social spheres, monetary and financial systems, high cross-cutting technologies, consumer, infrastructure, foreign trade and other spheres [11–13].

In contrast to the researching business activity mentioned above, the IE RAS Index currently has the maximum coverage of market subjects, because it takes into account macro-indicators of the development of main industries and spheres of national economy, forming the dynamics of value added and GDP growth [14, 15]. In addition, the IE RAS Index is based on monthly indicators, which allows you to quickly evaluate information on changes in the business activity of the State. The index is based on the actual data of statistical reporting of the development of relevant industries and spheres of the national economy.

The model includes a new indicator of total payables of organizations, which has increased dramatically.

As a result, the IE RAS Index takes into account the integral influence of macro-

[4] Information on the Plenary Meeting of the Petersburg International Economic Forum with the participation of the President of the Russian Federation, 17 June 2022. URL: http://kremlin.ru/events/president/news/68669 (accessed on 12.12.2022).

indicators of the dynamics of the development of ten spheres of the national economy: industrial, agricultural and construction production, cargo and passenger transport, wholesale and retail trade, paid services to the population, monetary aggregate M2 and total accounts payable by organizations.

Under conditions of high turbulence of socio-economic development there is a need to periodically adjust the composition of the national economy, taken into account in the formation of the IE RAS Index. However, it is important that this be done by including new, more relevant indicators and eliminating indicators that have lost their topicality.

Although this does not change the method of calculation IE RAS Index, but determines the analytical capabilities, completeness and depth of assessment of practical results of this indicator in the field of public accounting, forecasting and strategic planning of socio-economic development.

It is necessary to note the presence of a significant impact on business activity of a number of socio-political, social, shadow, informational and other factors that do not generally have a clear quantitative measurement in official statistical reporting. In this study they were not considered.

MATHEMATICAL MODEL FOR CALCULATING THE IE RAS INDEX

We will consider questions of mathematical modeling of the IE RAS Index.

Earlier, for the construction of the IE RAS Index, the approach related to the calculation of pairwise preference matrices was used (PPM) [14, 16]. Probabilistic approach was used when using PPM when constructing weights of integral index [17, 18], based on the Thurstone [19] model used to construct an integral indicator on the basis of its individual indicators [6]. However, given the mathematical basis requirements, there were some specific problems with the interpretation of the content side of PPM in the construction of weight coefficients. Thus, quite often the weights in the calculation could be negative, which required additional justification of such situations.

Past experience given and noted private problems, to construct an integral index of business activity in the future it is proposed to use a new method, which is based on the calculation of weights of private indicators of business activity by the coefficients of pair correlation between them [15].

Among the many ways to form weight coefficients the method we have proposed takes more fully into account the influence of the real economy and non-productive spheres on the dynamics of the index of business activity [20].

It should also be noted that IE RAS Index is not based on the values of the indicators, but on their growth rates. This is due to the fact that Rosstat often reviews the volumes of annual averages that are included in the index calculation, and the use of growth rates ensures a higher stability of their dynamics. In addition, the presented index is calculated as an aggregate growth rate from the same period of the previous year. In this case, monthly data is used for calculation.

The choice of pair correlation coefficients for the construction of weight coefficients of the integral index is due to the fact that it allows to evaluate the close relationship of the indicators used. The most important factor in this approach should be the private indicator, which is most closely related to the rest of the indicators, as its dynamics will change synchronously with the dynamics of the integral index. In order to find such private indicators, the sum of the coefficients of the pair correlation is estimated. The larger the amount, the stronger its connection to other indicators, and the higher its weight will be in the integral indicator.

The pair correlation coefficients allow the use of non-negative weights coefficients, since the weights of the partial indicators in this

Table 1

Weights of National Economy Spheres for Calculating the IE RAS Index

Indicator No.	Macro Indicators	Weights
		2018 — July 2022
1	Volume of industrial production	0.143
2	Volume of agricultural production	0.002
3	Volume of construction production	0.100
4	Freight turnover	0.127
5	Transport passenger turnover	0.148
6	Retail trade turnover	0.115
7	Wholesale trade turnover	0.111
8	Volume of paid services to the population	0.130
9	M2	0.042
10	Total accounts payable of organizations	0.083

Source: Developed by the authors.

case are defined as their share in the integral indicator. In addition, a weight coefficients condition is applied to the sum of weights equal to one.

In this case, the numerator uses the sum of the values of the pairwise preference matrices of the correlation, and the denominator uses the sum of all the elements of the matrix.

Let's r_{ij} — coefficient of the pair correlation between private indicators of business activity i and j (X) ($i, j = 1, 2, \ldots, m$), then the weights W_j are determined by the formula:

$$W_j = \frac{\sum_{j=1}^{m} |r_{ij}|}{\sum_{i=1}^{m} \sum_{j=1}^{m} |r_{ij}|},$$

where m — number of X.

In general, the integral index of business activity (Y) can be represented as follows:

$$Y = \sum_{j=1}^{m} X_j W_j,$$

where X_j — private indicator of business activity j; m — number of X.

In the practical application of this method $m = 10$ — the number of partial indicators used in the IE RAS Index.

The use of the matrix of coefficients of pair correlation is reasonable from a mathematical point of view, in this regard it is possible to speak about obtaining objective results of assessment of business activity.

This approach allows us to detect in advance the trends of economic development and accurately forecast the change in business activity trends and the emergence of new turning points in the dynamics of economic development in both positive and negative ways. In this way, the strategic development management system is provided with a reliable tool for timely decision-making, which is amply demonstrated by the results of practical calculations.

RESULTS OF PRACTICAL CALCULATIONS THE IE RAS INDEX AND COMPARISONS WITH THE ROSSTAT INDEX

In accordance with the proposed methodology, the weights of industries and sectors of the

Table 2

Dynamics of the IE RAS and Rosstat Indices in the Period 2018 — July 2022, (as a % of the Previous Year)

Month and year	IE RAS Index	Rosstat Index	Deviations of IE RAS Index from Rosstat Index
01.18	105.5	104.4	1.1
02.18	105.0	104.3	0.7
03.18	104.1	102.9	1.2
04.18	106.3	104.8	1.5
05.18	105.5	104.8	0.7
06.18	104.6	102.4	2.2
07.18	105.1	104.0	1.1
08.18	104.7	101.9	2.8
09.18	104.8	101.3	3.5
10.18	104.7	104.6	0.1
11.18	104.4	102.3	2.1
12.18	105.3	105.5	–0.2
Average value for a year	**105.0**	**103.6**	**1.4**
01.19	102.8	100.3	2.5
02.19	103.2	101.8	1.4
03.19	103.2	100.5	2.7
04.19	103.2	102.6	0.6
05.19	102.5	99.2	3.3
06.19	102.3	101.3	1.0
07.19	103.2	102.9	0.3
08.19	102.8	102.5	0.3
09.19	103.5	103.9	–0.4
10.19	104.3	104.0	0.3
11.19	103.0	101.8	1.2
12.19	102.9	102.1	0.8
Average value for a year	**103.1**	**101.9**	**1.2**
01.20	103.3	101.8	1.5
02.20	104.3	104.7	–0.4
03.20	98.4	102.3	–3.9
04.20	78.0	91.1	–13.1
05.20	78.1	90.8	–12.7

Table 2 (continued)

Month and year	IE RAS Index	Rosstat Index	Deviations of IE RAS Index from Rosstat Index
06.20	77.7	93.5	–15.8
07.20	88.7	95.8	–7.1
08.20	92.3	97.1	–4.8
09.20	94.8	98.2	–3.4
10.20	93.3	95.5	–2.2
11.20	93.3	98.8	–5.5
12.20	95.2	102.4	–7.2
Average value for a year	**91.5**	**97.7**	**–6.2**
01.21	95.0	98.5	–3.5
02.21	95.7	97.9	–2.2
03.21	103.2	103.4	–0.2
04.21	130.5	113.7	16.8
05.21	127.1	114.3	12.8
06.21	121.3	111.3	10.0
07.21	120.7	106.2	14.5
08.21	113.3	104.0	9.3
09.21	110.7	104.1	6.6
10.21	113.1	106.0	7.1
11.21	114.3	107.0	7.3
12.21	112.9	105.6	7.3
Average value for a year	**113.2**	**106.0**	**7.2**
01.22	112.5	107.7	4.8
02.22	109.1	104.8	4.3
03.22	104.0	101.6	2.4
04.22	98.8	97.1	1.7
05.22	98.1	96.5	1.6
06.22	96.9	95.3	1.6
07.22	97.7	97.0	0.7
Average value for 7 month	**102.5**	**100.0**	**2.5**

Source: Rosstat, developed by the authors.

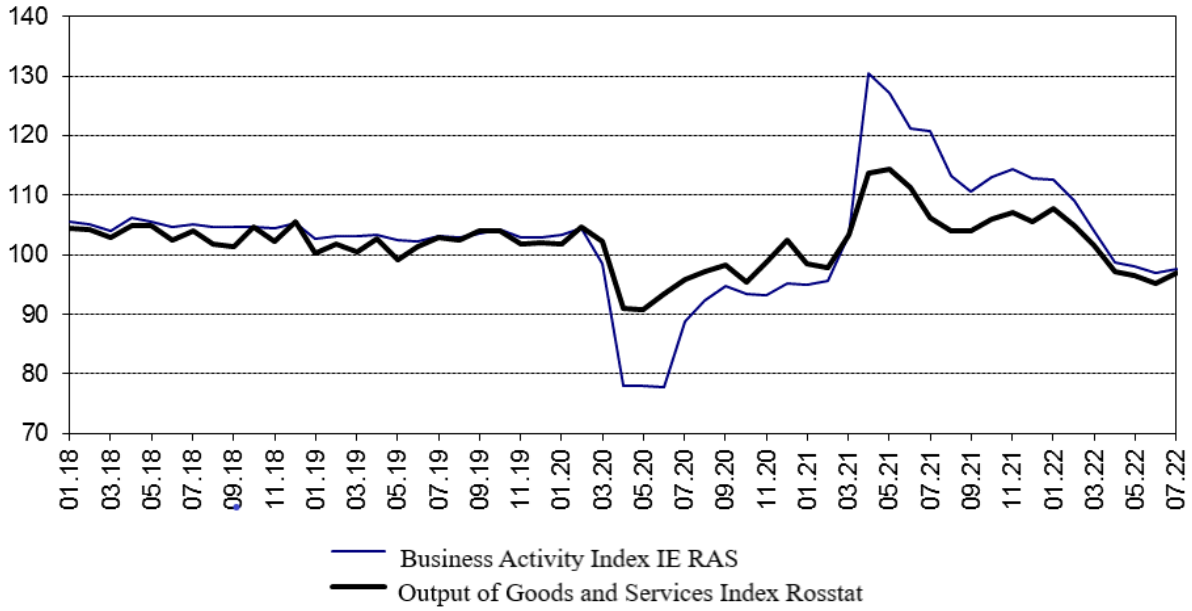

Fig. **Dynamics of the IE RAS and Rosstat Indices in the Period 2018 — July 2022 (as a % of the Previous Year)**

Source: Rosstat, developed by the authors.

national economy were calculated (*Table 1*) from 2018 to July 2022 inclusive.

This time interval includes the post-crisis 2018–2019, pandemic 2020–2021 and January–July 2022 (the initial stage of the mobilization period for the economy) and is characterized by high turbulence business activity caused by specific conditions of socio-economic development within each of these periods. The assessment of business activity in these periods has an additional important aspect to anticipate possible future behavior of the indicator in extreme conditions (such as a pandemic) [21].

Calculation of weights of the spheres of national economy showed that the first four places are accounted for by passenger transport turnover (0.148), industrial production (0.143), paid services to the population (0.130) and freight turnover (0.127), Reading by the highest instability of their growth dynamics, caused primarily by the coronavirus pandemic and unprecedented new western sanctions in 2022.

Fairly close weight coefficients received retail and wholesale trade (0.115 and 0.111 respectively), construction production (0.100) and total accounts payable by organizations (0.083). This is explained by the relatively unstable dynamics of their growth in the pandemic and mobilization for the economy periods.

The minimum weights belong to the monetary aggregate M2 (0.042) and agricultural production (0.002), which is a consequence of the most stable dynamics both in times of the worsening pandemic and the tightening of sanctions, and the recovery of growth after economic crises.

As a result of the calculation of monthly values of dynamics of IE RAS Index and their comparison with corresponding values of Rosstat Index (*Table 2 and Fig. 1*) were received strong evidence of the advantages of IE RAS Index.

The main advantages of the IE RAS Index are greater reliability and accuracy in determining the critical moments of changing the business activity trend and, accordingly, the timing of the occurrence and overcoming of the crisis processes in socio-economic development.

At the same time, despite the coincidence of trends, the growth rates of IE RAS and Rosstat

indices during the downturn and upturn of business activity are changing, which is especially evident in the graphical form (*Fig. 1*). Thus, during the fall IE RAS Index typically exhibits deeper dive into negative area, and in period of recovery business activity is outstripping the growth of the Rosstat Index.

A comparative analysis of the dynamics of both indices shows that in the post-crisis years of 2018 and 2019, there were minimal average annual growth of 1.4 and 1.2% respectively. At the same time, the orientation subannual monthly dynamics of the index coincides with a slightly higher IE RAS Index except in December 2018. This indicates stagnation of the economy due to damped business activity growth.

The highest average annual drop of the IE RAS Index and the Rosstat Index was observed in the pandemic in 2020 (by 8.5 and 2.3%, respectively), and the highest average annual growth in the post-pandemic 2021 (by 13.2 and 6.0%, respectively).

At the same time, according to the IE RAS method, more large-scale parameters of business decline and growth were recorded: June 2020 — maximum drop (22.3%) and April 2021 — maximum growth (30.5%) compared to the Rosstat Index: May 2020 — maximum drop (9.2%) and May 2021— maximum growth (14.3%).

At the same time, according to the IE RAS method, an earlier month of the beginning of the business activity decline in the pandemic year — March 2020 (a drop of 1.6%) compared to the Rosstat Index — April 2020 (a fall of 8.9%). At the same time, the IE RAS Index fell in March already 22%, and the same trend was maintained until December 2020, oriented on the fall of indices.

Instability of growth dynamics of IE RAS and Rosstat indices continued in the post-pandemic 2021, despite the coincidence of their growth trends. At the same time, at the beginning of the year the Rosstat Index showed more optimistic assessments of the transition to the growth dynamics of business activity than the IE RAS Index. However, starting from April, the dynamics of the IE RAS Index began to steadily outperform the Rosstat Index, which was a confirmation of the successful development of the economy during 2021 and at the initial stage of the mobilization period in 2022.

It is worth noting the special nature behavior of the IE RAS and Rosstat indices at the beginning of the period of mobilization for the economy.

First of all, this applies to the maximal synchronization of the dynamics of both indices, as evidenced by the exceptionally high correlation coefficient of indices dynamics for the seven months of 2022, equal to 0.997.

Another important feature of this period is the coincidence of the start of immersion of business activity in the negative — April 2022.

And the third feature is the coincidence of the maximum level of immersion indices in the negative area — June 2022: by 3.1 and 4.7% IE RAS Index and Rosstat index respectively.

However, the IE RAS Index showed a 2.5% increase in business activity over the period as a whole compared to the zero growth of the Rosstat Index.

This indicates a relatively higher level of mobilization by the State and business of anti-crisis measures related to the preparation and initiation of the SMO, based on the experience gained from the pandemic crisis. These facts have been widely corroborated by comparing the dynamics of the IE RAS and Rosstat indices in the 2020 pandemic and the initial mobilization period for the economy. The depth of immersion indexes in the negative region in 2020 exceeded its fall in the first seven months of 2022.

And the largest threat posed at the initial stage of counteraction large-scale Western sanctions in the monetary, financial, production and social spheres. At the same time, the greatest threat to the state sovereignty was the freezing of foreign currency reserves, the collapse of the national currency, capital flight,

the growth of accounts payable, the break in supply chains business processes.

However, as it turned out later the measures taken were still not enough. To give a systemic character to all work, the President of the Russian Federation formed a Coordination Council headed by the Chairman of the Government of the Russian Federation.[5]

CONCLUSION

Based on the research, it can be concluded that the IE RAS Index includes a fairly extensive list of economic, financial and social indicators, which allow to more fully reflect business activity in comparison with the Rosstat Index and business activity indices of other organizations.

A convincing justification of scientific novelty of the proposed methodology of construction and practical use of IE RAS Index are new models of determination of weights of indicators included in the Index and its calculation.

As the analysis of the results of practical calculations made on the basis of official statistics, the dynamics of the indices IE RAS and Rosstat are not contradictory and largely synchronized and single-directional.

However, IE RAS Index more precisely determines the beginning and end of systemic socio-economic crises, which allows predicting the duration of these processes.

The analysis of the dynamics of the IE RAS Index for the first seven months of 2022 leads to the conclusion that business activity fell less at the beginning of the mobilization period than the Rosstat Index. This also indicates a softer handling of economic, social, financial, monetary and other sanctions at this stage than during the pandemic period.

As a result, assessing the practical results and advantages of the proposed integral index of business activity, it may be considered that the use of the IE RAS Index in the management of strategic development in the new geopolitical reality requires its inclusion in the targets defining the ability of the country to ensure state sovereignty.

The IE RAS Index level can also serve as a criterion for assessing the efficiency of public administration of the country's economy as a whole, as well as its member industries and spheres of national economy in the respective period.

[5] Decree of the President of the Russian Federation No. 763 from 21.09.2022 "Coordination Council under the Government of the Russian Federation to meet the needs of the Armed Forces of the Russian Federation, other forces, military formations and organizations". URL: http://kremlin.ru/acts/news/69657 (accessed on 12.12.2022).

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ABOUT THE AUTHORS

Alexander A. Frenkel — Dr. Sci. (Econ), Prof., Chief Researcher, Institute of Economics, Russian Academy of Sciences, Moscow, Russia
https://orcid.org/0000-0002-6860-2118
Corresponding author:
ie_901@inecon.ru

Boris I. Tikhomirov — Cand. Sci. (Econ.), Leading Researcher, Institute of Economics, Russian Academy of Sciences, Moscow, Russia
https://orcid.org/0000-0003-2255-7144
bit169@mail.ru

Anton A. Surkov — Cand. Sci. (Econ.), Senior Researcher, Institute of Economics, Russian Academy of Sciences, Moscow, Russia
https://orcid.org/0000-0002-2464-5853
surkoff@inbox.ru

Authors' declared contribution:
A.A. Frenkel — statement of the problem, development of the concept of the article, formation of the conclusions of the study.
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