

# An Integral Model for Assessing the Economic Security of Regional Banks

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**Abstract**—The article is devoted to the study of an urgent issue in modern realities of economic development: an assessment of the economic security of the region. The author's methodology for assessing the economic security of banks in a region is presented, which consists in calculating an integral indicator determined by the method of a multidimensional average by indices for assessing changes in the development potential of the banking sector in a region, assessing changes in the riskiness of the banking sector in a region and assessing changes in the financial results of the banking sector in a region. The integrated assessment includes a synthesis of changes in the development potential of the banking sector, the riskiness of banking activities, and the financial results of the banking sector in the region. The article presents the approbation of the author's methodology on the example of the banking sector of the Belgorod region. The advantages and disadvantages of the proposed method are revealed. The use of the author's methodology will make it possible to analyze the effectiveness of the changes in the economic security of the regional banking sector carried out in the bank, draw appropriate conclusions and make informed management decisions for the further effective development of the regional banking system.

**Keywords**—economic security, bank, region, integral indicator, index, potential of the banking sector, banking risks, financial results.

## I. INTRODUCTION

At the present stage of development of economic relations, the issues of safety of activity are priority directions in the functioning and development of any economic system.

Economic security is an integral element of the national security of both the country and the region [32].

For the purposes of this study, we will consider economic security at the regional level.

The following conditions of economic security of the region are distinguished [33]:

- 1) expanded reproduction;
- 2) high standard of living of the population;

3) stability and sustainable development of the financial system.

It is obvious that stable and sustainable development of the region's financial system is impossible without sustainable regional development of the banking system. Which is largely determined by the economic security of commercial banks operating in the region. Modern conditions for the development of economic relations put forward special requirements for the banking sector. The main threat to the economic security of the economy in general, as well as the banking system in particular, is the global spread of the coronavirus infection COVID-19.

The Bank of Russia in its Financial Stability Review [11] identified the main channels of influence of the spread of COVID-19 on the global economy, on the basis of which we have identified only those that have an impact on the economic security of banks in the region (Fig. 1).

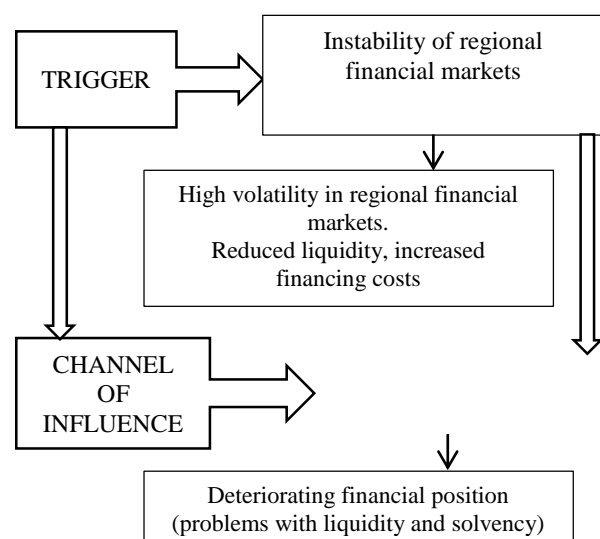


Fig. 1. The main channels of influence of COVID-19 on the regional financial system

Thus, at the present stage of the development of economic relations, the issues of security of activities are a priority in the activities and development of both any regional economic system and the banking sector of the region.

Scientific works of both domestic and foreign authors are devoted to the study of the economic security of commercial banks [1-11, 12-33]. However, the issues of assessing the economic security of commercial banks at the regional level have been studied extremely poorly.

The main goal of assessing the economic security of banks in the region is to obtain several basic, most informative parameters that give an objective and accurate picture of the development of the banking sector, change the stability and riskiness of the banks in the region. Such information can be obtained as a result of a comprehensive analysis of the economic security of the banking sector in the region. Analysis of the economic security of banks, in our opinion, will make it possible to track trends in the development of the banking sector in the region and serve as a link between the development of management decisions and the actual activities to improve the stability and reliability of banks.

Thus, it can be argued that the analysis of the economic security of banks in the region is, first of all, the basis for making timely managerial decisions aimed at increasing the financial stability of the region.

The purpose of the study is to develop an integral model for assessing the economic security of the banking sector in the region.

The subject of the research is the economic security of banks.

The object of the research is the banking sector of the Belgorod region.

## II. METHODS

The study implements methods for establishing the causal relationship of economic phenomena; cognition of the nature, essence and object specifics of the process under study; logical justification of the conclusions made; studying the dialectics of the development of the research object in the context of the factors influencing it.

## III. MAIN PART

An important condition for achieving the goals set to increase the financial stability of the region, in our opinion, is the assessment of the economic security of the banking sector in the region. To calculate the assessment of the economic security of the banking sector in the region, we propose to use the integral indicator, which is determined by the method of the multidimensional average according to the formula of the geometric mean by the indices, the assessment of the corresponding characteristics of the economic security of the banking sector (assessment of the development potential of the banking sector, assessment of the banking sector's riskiness, assessment of the financial performance of the banking sector).

$$I_{ESR} = \sqrt[3]{I_P \cdot I_R \cdot I_{FR}}, \quad (1)$$

where  $I_{ESR}$  – is the integral index for assessing changes in the economic security of the banking sector in the region;

$I_P$  – index for assessing changes in the development potential of the banking sector in the region;

$I_R$  - index for assessing changes in the riskiness of the banking sector in the region;

$I_{FR}$  – is the index for assessing changes in the financial results of the banking sector in the region.

The methodology for calculating the integral index for assessing changes in the economic security of the banking sector in the region is shown in Fig. 2.

The method of constructing an integral index for assessing changes in the economic security of the regional banking sector is based on the formation of three indices: an index for assessing changes in the development potential of the banking sector in the region ( $I_P$ ), an index for assessing changes in the riskiness of the banking sector in the region ( $I_R$ ) and an index for assessing changes in financial performance the banking sector of the region ( $I_{FR}$ ).

The index of assessing the impact of measures to improve bank lending on the credit potential of the bank, in our opinion, can be determined by calculating the author's indicators (Table 1).

The calculation of indices for assessing the development potential of the banking sector in the region will allow us to determine how the economic security of the banks in the region has changed due to the impact on them of such indicators as:

- the volume of assets of the banking sector in the region;
- the size of the gross regional product;
- the share of assets of the banking sector in the region in the gross regional product;
- the volume of deposits of individuals attracted by banks in the region;
- the share of deposits of individuals attracted by banks in the region in the gross regional product;
- the volume of customer funds in the accounts of the banking sector in the region;
- the share of customer funds in the accounts of the banking sector in the region in the gross regional product.

In our opinion, the overall assessment of changes in the development potential of the banking sector in the region should be determined by the formula:

$$I_P = \sqrt[6]{I_a \cdot I_{da} \cdot I_v \cdot I_{dv} \cdot I_s \cdot I_{ds}} \quad (2)$$

It should be noted that if the obtained indicator is higher than 1, then this indicates an increase in the development potential of the banking sector in the region in the reporting period compared to the base period. If the value of the calculated index is less than 1, then this indicates a decrease in the development potential of the banking sector in the region in the reporting period compared to the base period. If the index of change in the development potential of the banking sector in the region is equal to 1, then the potential of the banking sector in the reporting period relative to the base period did not change.

The index for assessing the change in the riskiness of the banking sector in the region, in our opinion, can be determined using the author's indicators (Table 2).

The calculation of the risk assessment indices of the banking sector in the region will allow to determine how the economic security of the banks in the region has changed due to the influence of the main types of banking risks, namely, to assess the impact of such indicators as:

- the level of credit risk (the amount of overdue debt, the share of overdue debt in the loan portfolio of the banking sector, etc.);

- the level of currency risk (the share of assets in foreign currency, the share of liabilities in foreign currency, the share of loans issued in foreign currency, the share of deposits attracted in foreign currency, etc.);

- the level of liquidity risk (standards of absolute liquidity, current liquidity; long-term liquidity, the share of absolutely liquid assets in the total assets of the bank, etc.);

- the level of stock risk (the share of investments in securities in the assets of banks, the share of investments in government securities in the stock portfolio of banks, etc.).

It should be noted that calculating the level of one or another type of banking risk is a difficult analytical task, since it does not have a generally accepted calculation methodology. When calculating risks, you can use the methods of the Bank of Russia, in addition, you can use the methods described in the scientific works of scientists.

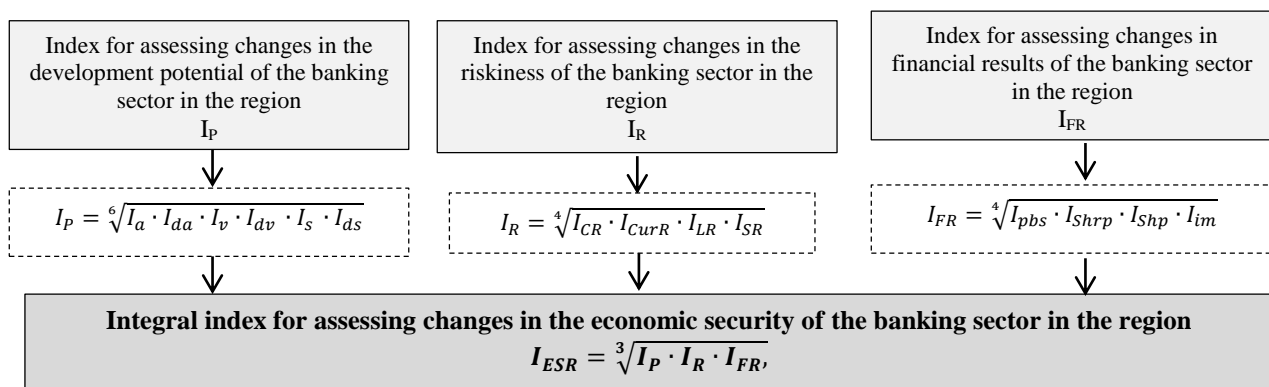


Fig. 2 Formulas for calculating the integral index for assessing changes in the economic security of the banking sector in the region (compiled by the authors)

TABLE I. INDICATORS FOR ASSESSING CHANGES IN THE DEVELOPMENT POTENTIAL OF THE BANKING SECTOR IN THE REGION \*

No	Indicator	Indicator calculation formula	Legend
1	Regional banking sector asset volume index	$I_a = \frac{V_{a1}}{V_{a0}}$	$V_{a1}, V_{a0}$ – the volume of assets of the banking sector in the region in the reporting and base periods
2	Index of the share of assets of the banking sector in the region in the GRP	$I_{da} = \frac{D_{a1}}{D_{a0}}$	$D_{a1}, D_{a0}$ – the share of banking sector assets in the region in the gross regional product (GRP) in the reporting and base periods
3	Index of the volume of deposits of individuals in the banking sector of the region	$I_v = \frac{V_{v1}}{V_{v0}}$	$V_{v1}, V_{v0}$ – the volume of deposits of individuals attracted by banks in the region in the reporting and base periods
4	Index of the share of deposits of individuals in the region's banking sector in GRP	$I_{dv} = \frac{D_{v1}}{D_{v0}}$	$D_{v1}, D_{v0}$ – the share of deposits of individuals attracted by banks in the region in the gross regional product (GRP) in the reporting and base periods
5	Index of the volume of customer funds in the accounts of the banking sector in the region	$I_s = \frac{V_{s1}}{V_{s0}}$	$V_{s1}, V_{s0}$ – the volume of customer funds in the accounts of the banking sector in the region in the reporting and base periods
6	Index of the share of customer funds in the accounts of the banking sector in the region in GRP	$I_{ds} = \frac{D_{s1}}{D_{s0}}$	$D_{s1}, D_{s0}$ – the share of customer funds on the accounts of the banking sector in the region in the gross regional product (GRP) in the reporting and base periods

\* Compiled by the authors

TABLE II. INDICATORS FOR ASSESSING CHANGES IN THE RISKINESS OF THE BANKING SECTOR IN THE REGION \*

No	Indicator	Indicator calculation formula	Legend
1	Credit risk index	$I_{CR} = \frac{L_{CR0}}{L_{CR1}}$	$L_{CR1}, L_{CR0}$ – the level of credit risk of the banking sector in the region in the reporting and base periods
2	Currency risk index	$I_{CURR} = \frac{L_{CURR0}}{L_{CURR1}}$	$L_{CURR1}, L_{CURR0}$ – the level of currency risk of the banking sector of the region in the reporting and base periods
3	Liquidity risk index	$I_{LR} = \frac{L_{LR0}}{L_{LR1}}$	$L_{LR1}, L_{LR0}$ – the level of liquidity risk of the banking sector in the region in the reporting and base periods
4	Stock risk index	$I_{SR} = \frac{L_{SR0}}{L_{SR1}}$	$L_{SR1}, L_{SR0}$ – the level of stock exchange risk of the banking sector in the region in the reporting and base periods

\* Compiled by the authors

**TABLE III. INDICATORS FOR ASSESSING CHANGES IN THE FINANCIAL RESULTS OF THE BANKING SECTOR IN THE REGION \***

Nº	Indicator	Indicator calculation formula	Legend
1	Regional banking sector profit index	$I_{pbs} = \frac{V_{pbs1}}{V_{pbs0}}$	$V_{pbs1}, V_{pbs0}$ – the volume of profit of the banking sector in the region in the reporting and base periods
2	Index of the share of profits of banks in the region in the gross regional product	$I_{shpr} = \frac{Sh_{pr1}}{Sh_{pr0}}$	$Sh_{pr1}, Sh_{pr0}$ – the share of profit of the banking sector in the region in the gross regional product (GRP) in the reporting and base periods
3	Index of the share of profitable banks in the region in the total number of banks in the region	$I_{shp} = \frac{Sh_{p1}}{Sh_{p0}}$	$Sh_{p1}, Sh_{p0}$ – the share of profitable banks in the region in the total number of banks in the region in the reporting and base periods
4	Regional banking sector interest margin index	$I_{im} = \frac{V_{im1}}{V_{im0}}$	$V_{im1}, V_{im0}$ – the volume of profit of the banking sector in the region in the reporting and base periods

\* Compiled by the authors

In our opinion, the overall assessment of changes in the riskiness of the banking sector in the region should be determined by the formula:

$$I_R = \sqrt[4]{I_{CR} \cdot I_{CurR} \cdot I_{LR} \cdot I_{SR}} \quad (3)$$

The index for assessing changes in the financial results of the banking sector in the region, in our opinion, can be determined using the author's indicators presented in table. 3.

Calculation of indices for assessing changes in the financial results of the banking sector in the region will make it possible to determine the impact on economic security of such indicators as:

- the amount of interest income and interest expenses of the bank;
- the value of the interest margin;
- the level of profitability of bank lending;
- the profitability of the bank's lending operations.

The overall assessment of changes in the financial results of the banking sector in the region, in our opinion, should be determined by the formula:

$$I_{FR} = \sqrt[4]{I_{pbs} \cdot I_{shpr} \cdot I_{shp} \cdot I_{im}} \quad (4)$$

Let us test the proposed author's methodology based on the data of the banking sector of the Belgorod region.

The initial data for calculating indicators for assessing changes in the development potential of the banking sector in the region are presented in Table. 4.

**TABLE IX. INITIAL DATA FOR CALCULATING INDICATORS FOR ASSESSING CHANGES IN THE DEVELOPMENT POTENTIAL OF THE BANKING SECTOR OF THE BELGOROD REGION IN 2019 YEAR \***

Indicator	2019 year	
	at the beginning of the year	at the end of the year
1. Total assets of banks, mln. rubles	9818	9373
2. Deposits of individuals, mln. rubles	4989	4683
3. Customer funds in bank accounts, mln. rubles	1344	1154
4. Share of assets in gross regional product, %	1.13	1.03
5. Share of assets in gross regional product, %	0.58	0.51
6. Share of customer funds in bank accounts in the gross regional product, %	0.16	0.13

\* Compiled by the authors based on data from the Belgorod Region Branch of the Bank of Russia

The initial data for calculating indicators for assessing changes in the riskiness of the banking sector in the region are presented in Table 5.

**TABLE X. INITIAL DATA FOR CALCULATING INDICATORS FOR ASSESSING THE RISKINESS OF THE BANKING SECTOR OF THE BELGOROD REGION IN 2019 YEAR \***

Indicator	2019 year	
	at the beginning of the year	at the end of the year
1. Loans in rubles, mln. rubles	4041	4297
2. Loans in foreign currency, million rubles	270	266
3. Overdue debt, mln. rubles	146	152
4. Overdue consumer loans, mln. rubles	1.3	1.3
5. Investments in securities - total, million rubles, including investments in government securities	1518	1469
6. The share of overdue loans in the loan portfolio, %	0.030	0.028
7. Share of loans in foreign currency in the loan portfolio, %	6.68	6.19
8. Share of investments in government securities in the total volume of the securities portfolio, %	23.12	22.33

\* Compiled by the authors based on data from the Belgorod Region Branch of the Bank of Russia

The initial data for calculating indicators for assessing changes in the riskiness of the banking sector in the region are presented in Table 6.

**TABLE XI. INITIAL DATA FOR CALCULATING INDICATORS FOR ASSESSING THE FINANCIAL RESULTS OF THE BANKING SECTOR OF THE BELGOROD REGION IN 2019 YEAR \***

Indicator	2019 year	
	at the beginning of the year	at the end of the year
1. Total profit of banks, mln. rubles	184.3	211
2. Share of profit in gross regional product, %	0.021	0.023
3. The share of profitable banks in the total number of banks, %	100	100

\* Compiled by the authors based on data from the Belgorod Region Branch of the Bank of Russia

The calculation of the integral index for assessing changes in the economic security of the banking sector of the Belgorod Region for 2019 is presented in Table. 7.

TABLE XII CALCULATION OF THE INTEGRAL INDEX FOR ASSESSING CHANGES IN THE ECONOMIC SECURITY OF THE BANKING SECTOR IN THE BELGOROD REGION FOR 2019 YEAR

Indicator	Legend	Yearly value
<i>Indicators for assessing changes in the development potential of the banking sector in the region</i>		
Regional banking sector asset volume index	$I_a$	0.95
Index of the share of assets of the banking sector in the region in the GRP	$I_{da}$	0.94
Index of the volume of deposits of individuals in the banking sector of the region	$I_v$	0.86
Index of the share of deposits of individuals in the region's banking sector in GRP	$I_{dv}$	0.91
Index of the volume of customer funds in the accounts of the banking sector in the region	$I_s$	0.88
Index of the share of customer funds in the accounts of the banking sector in the region in GRP	$I_{ds}$	0.81
<i>Index for assessing changes in the development potential of the banking sector in the region</i>	$I_p$	0.89
<i>Indicators for assessing changes in the riskiness of the banking sector in the region</i>		
Credit risk index	$I_{CR}$	1.07
Currency risk index	$I_{CURR}$	0.93
Liquidity risk index	$I_{LR}$	1
Stock risk index	$I_{SR}$	0.97
<i>Index of changes in the riskiness of the banking sector in the region</i>	$I_R$	0.99
<i>Indicators for assessing changes in the financial results of the banking sector in the region</i>		
Regional banking sector profit index	$I_{pbs}$	1.14
Index of the share of profits of banks in the region in the gross regional product	$I_{shpr}$	1.10
Index of the share of profitable banks in the region in the total number of banks in the region	$I_{shr}$	1

Based on the results of calculating the integral index for assessing changes in the economic security of the banking sector of the Belgorod Region, it can be concluded that in 2019 the financial stability of the banking system of the region decreased, as evidenced by the value of  $I_{EBR} = 0.97$  (a value less than 1 corresponds to a reduction in the characteristic in the study period).

This negative dynamics is associated with a decrease in the development potential of the banking sector in the region, which is characterized by the value of the indicator  $I_{np} = 0.89$  and an increase in banking risks, as evidenced by the value of the indicator  $I_P = 0.99$ . The index for assessing changes in the financial results of the banking sector had a positive impact on the economic security of the region's banks.

#### IV. CONCLUSION

The proposed author's methodology for assessing the economic security of banks in the region, in our opinion, has a number of advantages:

- allows to identify specific elements of the economic security of the banking sector in the region, which were influenced;

- allows you to determine what (positive, negative or zero) impact was made by indicators characterizing the economic security of the banking sector in the region;

- is easy to use;

- can be used both at the regional level and at other levels of the banking sector (both state and municipal).

It should be noted that the proposed method, despite its objective advantages, has a number of disadvantages, the main one being that the proposed indicators reflect the cumulative impact on the economic security of all factors that affect the development of the banking sector in the region, i.e. when assessing, it is necessary to make an adjustment for the influence of macroeconomic factors.

In general, in our opinion, the use of this methodology will make it possible to analyze the effectiveness of the changes in the economic security of the regional banking sector carried out in the bank, draw the appropriate conclusions and make informed management decisions for the further effective development of the regional banking system.

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