

Assessment of the financial stability of the region

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Abstract

The article determines the need to assess the financial sustainability of the regional economy on the example of Donetsk region. The study is based on the development of methods and assessment criteria, which allow to determine the level of financial sustainability of the regional economy. The method of complex assessment, which allows most reliably assess the financial sustainability of the region on the basis of statistical data borrowed from official sources of statistics, has been chosen as an effective assessment tool. Characterization of the region allowed to analyze the processes taking place in the economy of the region. The assessment methodology presented by the author on the basis of financial and economic indicators made it possible to identify the state of the financial system of the regional economy. The application of the methodology of the complex assessment allowed determining the value of the integral index and classifying the level of financial sustainability of the economy of Donetsk region. According to the results of a comprehensive assessment of the financial sustainability of the economy on the example of Donetsk region has identified a number of problems affecting the stability of the financial system. As a solution, the author proposes a set of necessary measures to ensure the sustainable development of the financial system in the region's economy. The practical significance of the research lies in the possibility of applying the methods of assessment of the state and regional authorities and research results for further monitoring and adjustment of the regional policy, which will prevent crisis situations and improve the financial position of the regional economy.

Keywords: financial stability of the region, assessment criteria, integrated assessment methodology.

Introduction

The region, as a socio-economic system, is influenced by a variety of factors of the external environment, so it needs to build on the existing situation in order to achieve its sustainable development.

The system can have the feature of economic growth, which is determined by the positive influence of external environment factors and requires additional expenditure of resources for its transition to a qualitatively new state. A fall, forcing the system to mobilize internal resources for its return to the planned state, is caused by the negative

influence of environmental factors.

Favorable or unfavorable influence of the external environment requires from the region for its effective functioning and development an additional expenditure of resources to achieve financial sustainability.

In modern conditions, the sustainable development of the region, to a greater extent, is determined by the efficiency of financial and credit relations and is largely determined by the financial sustainability and security of the subjects of regional reproduction.

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Sustainable development of the region and the level of its financial sustainability are in close correlation, as regional finances directly depend on the degree of development of its economy and social sphere. A significant part of its own revenues is accumulated at the expense of tax revenues to the regional

budget and is used, mainly, taking into account the directions of socio-economic development of the regional infrastructure. Therefore, determining the level of financial sustainability of the region is an urgent problem.

Material and methods

The development and implementation of the methodology of integral assessment of the financial sustainability of the region and its economic security is an important element of the management system and a topical problem studied in scientific circles (Afonso, 2015; Bolívar, 2016; Augustine, 2013; Buleev, 2019; Bryukhovetskaya, 2020).

Ensuring the sustainable development of the socio-economic system is based on the implementation of the relevant principles for its assessment:

- preservation and improvement of the quality of life;
- guaranteeing an appropriate level of health care;
- ensuring the necessary living needs of the population and future generations;
- preventing and combating poverty of the population;
- maintaining an effective balance between the areas of production and consumption;
- rational use of natural resources;
- preservation and protection of the ecosystem;
- monitoring and ensuring environmental safety;
- preventing and reducing violence against man and nature;
- formation of a global partnership (Shovgenov, 2007).

The foundation of the socio-economic development of the region are economic, social and environmental problems, and everything associated with them, and should also consider ways to solve these problems directly related to a particular territory, which should be supported by a certain information and analytical system. That is, the economic,

environmental and social characteristics should be taken into account in a certain system of relevant indicators (indicators) (Artemenko, 2006).

Achievement of the sustainability of the region is provided by the interconnectedness of social, environmental and economic systems. At that, environmental factors are more important, because, firstly, they are present in each of the systems, and secondly, they participate in the maintenance of physiological functions of a person (quality of food and drinking water, etc.) or in the formation of personal properties "socio"-information contact with holistic natural systems (Melnik, 2006).

Developed and substantiated the methodological support for the assessment and prediction of the effectiveness of macroeconomic regulation of the development of cascade forms of organization of production and economic, inter-regional and inter-sectoral interaction of regional socio-economic systems in Ukraine (Danylyshyn, 2016). However, when determining the level of development of the regional socio-economic system, the authors do not take into account the influence of the environmental component.

Thus, (Gerasymchuk, 2002) believes that it is possible to determine the level of development of the region by determining the social, economic and environmental factors. The author proposes to evaluate the region's sustainable development in the following stages:

- expert assessment of the significance of the indicators affecting the development of the region;

- the calculation of the partial indices of regional development for the indicators that have a positive and negative impact on the development of the region
- the calculation of the integral index of the regional development;
- the region's rating;
- the calculation of the integral index of sustainable development;
- the grouping of regions based on their

level of development;

- the analysis of the tendencies of regional development. The study used modern scientific domestic and foreign literature on the digital ecosystem and clusterization, statistical and analytical materials found on thematic Internet sites and in print media. The main methods of study are empirical and theoretical: observation, comparison, graphical, statistical and econometric analysis.

Results and discussion

The general methodological provisions of the integral assessment of the financial sustainability of the region is a unified system of ideas about the priorities, tasks and principles in the sphere of their assessment, as well as the mechanism of its implementation.

The need to create a methodology for the integral assessment of the financial sustainability of a region is determined by the importance of ideas about the strategic goals and priorities of the regional government policy, directions and means of implementation of these goals.

Financial sustainability of the region is one of the main indicators that characterize its financial security, the ability to form its own budget revenues and total budget revenues of the region.

The objectives of creating the methodology are:

- determination of the current state of the region and the factors affecting this state;
- identifying current and potential problems of the region's development;
- including the analysis of long-term socio-

economic trends in the budget process;

- elaboration of the strategy of further development of the region on the basis of the results of the analysis.

The methodology of the integral assessment of the financial stability of the region includes the following stages (Fig. 1).

The first stage involves the formation of an information set for the integral assessment of the financial stability of the region, on the basis of which the system of groups of indicators is formed in the context of the components of the study of financial stability in the region: financial, demographic, economic and human resources (Buleev, 2013).

The second stage involves the calculation of indicators in the context of the components of the study of financial sustainability of the region and their interpretation.

Multiple regression modeling is used to calculate the integral index of the financial component of the n-th region in the t-th period.

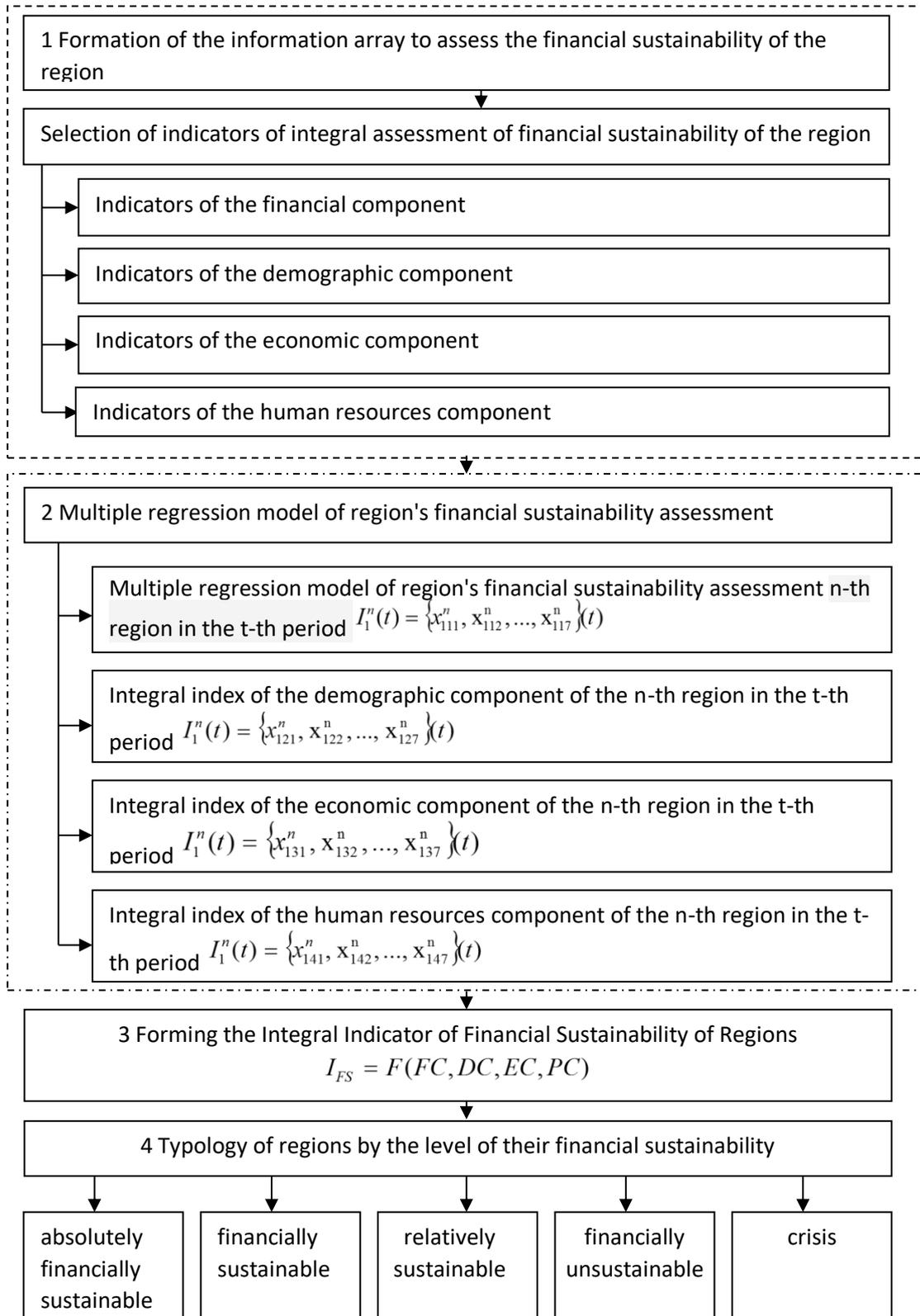


Figure 1 – Methodology of Integral Evaluation of Financial Stability of a Region

Source: suggested by the author.

$FS = a_1x_1 + a_2x_2 + a_3x_3 + \dots + a_nx_n,$ (1) characterize the components of the financial stability of the region;
 where $x_{1,2,3,\dots,n}$ - are the indicators that a_1, a_2, a_3 - regression coefficients;

a_0 - free member.

The demographic, economic and personnel components are assessed in a similar way.

At the third stage the calculation of the integral index of financial stability of the region is carried out with the help of multiplier regression modeling.

$$I_{fc} = a_1X_1 + a_2X_2 + a_3X_3 + \dots + a_nX_n, \quad (2)$$

where $x_{1,2,3\dots n}$ are the components of the financial stability of the region;

a_1, a_2, a_3 - regression coefficients;

a_0 - free member.

The growth (decrease) of the level of the integral index of financial sustainability of the region in dynamics indicates the growth (decrease) of sustainability and reliability.

At the fourth stage the typology of regions according to the level of their financial sustainability is carried out. Depending on the level of the integral index of financial sustainability of the region the following types

are distinguished: absolutely financially stable, financially stable; relatively stable; financially unstable, crisis.

Quantitative interpretation of the level of financial sustainability of the region is determined by the following formula (Posilkina, 2002):

$$R = \frac{(K_{\Phi}^{\text{MAX}} - K_{\Phi}^{\text{CP}}) + (K_{\Phi}^{\text{MIN}} - K_{\Phi}^{\text{CP}})}{2}, \quad (3)$$

where R - the range of the level of financial stability of the region;

K_{Φ}^{CP} - the middle of the interval between compatible values of the i -th indicator;

K_{Φ}^{MAX} - the maximum value of the i -th indicator;

K_{Φ}^{MIN} - the minimum value of the i -th indicator.

In order to carry out a qualitative integral assessment of the financial sustainability of the region it is necessary to analyze its level and consider it in the dynamics (table 1).

Table 1. The matrix of the level of financial stability of the region and its dynamics

Level of financial stability	Type of financial stability	Trend		
		Value improvement	Sustainable value	Degradation of value
1–0,81	absolutely financially stable	+ 0,9	= 0,9	– 0,9
0,61–0,80	financially stable	+ 0,7	= 0,7	– 0,7
0,41–0,60	relatively stable	+ 0,5	= 0,5	– 0,5
0,21–0,40	financially unstable	+ 0,3	= 0,3	– 0,3
0–0,20	crisis	+ 0,10	= 0,10	– 0,10

Source: developed by the authors

The possible level of financial sustainability given in table 1 can be characterized as follows.

With the type of absolute financial sustainability, the trend of "+0.9" characterizes the favorable state of development of the region, which is improving in the dynamics.

With the type of absolute financial sustainability, the trend "= 0.9" is assessed as favorable and characterized as stable.

With the type of absolute financial

sustainability, the trend "-0.9" is defined as favorable, but with the deterioration of the state of development of the region.

At the financially stable type, the trend "+0.7" is assessed as stable with a positive dynamic of development.

At financially stable type the tendency "= 0.7" is defined as stable.

At financially stable type the tendency "-0.7" is evaluated as stable with negative dynamics of

development.

With a relatively stable type, the trend of "+0.5" is assessed as good, with positive dynamics of development.

With a relatively stable type, the tendency "=0.5" is rated as stable good.

With a relatively stable type, the trend of "-0.5" is characterized as approaching satisfactory, with negative dynamics of development.

At financially unstable type the trend "+0.3" is estimated as satisfactory, with positive dynamics of development.

At financially unstable type the trend "=0.3" is estimated as stably satisfactory.

At financially unstable type the trend "-0,3" is estimated as approaching to critical, with negative dynamics of development.

With the crisis type, the tendency "+0.1" is evaluated as critical, with positive dynamics of development.

With the crisis type the tendency "=0.1" is evaluated as stably critical.

With the crisis type, a trend of "-0.1" is evaluated as critical, with negative dynamics of development.

Let us carry out an integral assessment of the financial sustainability of the region on the basis of the suggested methodology. Since the indices, which characterize the financial sustainability of a region, have different units of measurement, we conduct their normalization, which will bring all the indices in the interval from 0 to 1. On the basis of the formed system of normalized indices (Table 2) we conduct the calculation of integral indices on the example of Donetsk region.

Table 2. Normalized indicators characterizing the financial stability of the Donetsk region

Indicator	2018	2019	2020
Financial component			
1 own per capita income	0,128	0,147	1
2 assessment of financial receipts	0,763	1	0,769
3 budget spending per capita	0,543	0,578	1
4 target spending level	0,893	1	0,866
5 level of capital expenditure	0,739	0,956	1
6 financing of targeted programs	0,714	0,857	1
7 current (total) deficit	0,180	0,008	1
8 budget balance	0,893	1	0,921
Demographic component			
1 Population	0,452	0,131	0
2 average age of the population	0,805	0,944	1
3 number of unemployed	1	0,375	0
4 per capita cash income	0,987	0,989	1
5 per capita cash expenditures	0,973	0,980	1
Economic component			
1 operating enterprises	0,045	0,058	0,087
2 average monthly salary of employees	0,786	0,761	1
3 structure of the utility sector	0	0	0
4 efficiency of functioning of public utilities	0,933	1	1
Personnel component			
1 quality factor for the performance of managerial functions	0,500	0,100	0
2 maintenance costs of one management employee	0,928	0,952	1

3 coefficient of technical equipment of managerial work	0	0,769	0,846
4 coefficient of labor discipline	0	0,789	0

Source: developed by the authors

Integral indices of financial sustainability components are as follows:

- integral index of the financial component:

$$Ifc = 1,1017 - 0,054X_1 + 0,350 X_2 + 0,307X_3 - 0,0011 X_4 - 0,191 X_5 - 0,062X_6 + 0,032 X_7 - 0,623 X_8, \quad (4)$$

where X_1 - own income per capita;

X_2 - estimate of financial revenues;

X_3 - budget expenditures per capita;

X_4 - level of targeted (execution of state powers) expenditures;

X_5 - level of capital expenditures;

X_6 - financing of targeted programs;

X_7 - current (total) deficit;

X_8 - budget balance.

The value of the multiple correlation coefficient is 0.9037, and the coefficient of determination is 0.8167. Fisher's test is 2.67, with the table value of 2.45. Since the obtained actual value of the Fisher test exceeds the tabulated one, the coefficient of determination is statistically significant and the regression equation is statistically reliable;

- integral index of the demographic component:

$$Idc = 0,5874 + 0,116 X_1 - 0,203 X_2 + 0,074 X_3 + 0,359 X_4 - 0,481 X_5, \quad (5)$$

where X_1 - population of the region;

X_2 - average age of population;

X_3 - employment;

X_4 - average monetary income per capita;

X_5 - average per capita cash expenditures.

The value of the multiple correlation coefficient is 0.8466, and the coefficient of determination is 0.7169. Fisher's test is 3.03, with a tabulated value of 2.45. Since the obtained actual value of the Fisher test exceeds the tabulated value, the coefficient of determination is statistically significant and the regression equation is statistically reliable;

- the integral index of the economic component:

$$Iec = 0.934 - 0.148 X_1 - 0.342 X_2 - 0.150 X_3 + 0.073 X_4, \quad (6)$$

where X_1 - number of working enterprises;

X_2 - average monthly wage of employees;

X_3 - structure of communal sector;

X_4 - efficiency of functioning of communal enterprises.

The value of the multiple correlation coefficient is 0.7660 and the coefficient of determination is 0.5876. Fisher's test is 2.49, with a tabulated value of 2.45. Since the obtained actual value of the Fisher test exceeds the tabulated one, the coefficient of determination is statistically significant and the regression equation is statistically reliable;

- integral index of the personnel component:

$$Ipc = 0.494 + 0.089X_1 + 0.095 X_2 + 0.07 X_3 + 0.17 X_4 \quad (7)$$

where X_1 - the coefficient of the quality of performance of managerial functions;

X_2 - expenditures for the maintenance of one managerial employee

X_3 - coefficient of technical equipment of managerial labor

X_4 - coefficient of labor discipline.

The value of the multiple correlation coefficient is 0,8769 and the coefficient of determination is 0,7689. The Fisher test is 5.82, with a table value of 2.45. Since the obtained actual value of the Fisher test exceeds the tabulated one, the coefficient of determination is statistically significant and the regression equation is statistically reliable.

The integral index of financial stability of the region has the following form:

$$IFS = -0,213 + 0,116*Ifc + 0,216 *Idc + 0,239 *Iec + 0,683*Ipc, \quad (8)$$

The value of the multiple correlation coefficient is 0.9071 and the coefficient of determination is 0.8229. Fisher's test is 8.13, with a tabulated value of 2.45. Since the obtained actual value of the Fisher test exceeds the tabulated one, the coefficient of determination is statistically significant and the regression equation is statistically reliable.

Let's calculate the integral index of financial sustainability by the example of Donetsk region (Table 3).

Table 3 – The value of the integral index of financial stability in Donetsk region

Period	lfc	ldc	lec	lpc	IFS
2018	0,791	0,751	0,693	0,596	0,720
2019	0,761	0,695	0,702	0,785	0,680
2020	0,827	0,659	0,616	0,648	0,690

As the results showed the value of integral index of financial sustainability of Donetsk region decreased from 0,72 to 0,69, that is 0,03 points, which indicates the deterioration of the situation in the region. Despite the negative trend in the value of the integral index of qualitative changes in the type of financial stability of the region has not occurred.

In order to solve the problems of sustainable development of the regional economy and ensure a high level of financial sustainability it is necessary to implement the following strategic measures.

1. In order to achieve a balanced regional budget it is necessary to optimize the revenue part of the budget and minimize its expenditure

part as a result of refusal from inefficient system of tax benefits and preferences, reduction of inappropriate use of funds as well as non-productive expenses.

2. It is necessary to develop an effective fiscal and tax policy of the region, aimed at increasing the tax base and rational redistribution of budgetary funds in the priority areas of socio-economic activity.

3. It is necessary to create a favorable investment climate for attraction of new financial resources and development of spheres of financial and economic activity.

4. It is necessary to form a favorable environment for the development of small and medium businesses in the region on the basis of state and regional support for compliance with legal requirements.

5. It is necessary to improve own production enterprises and to increase the level of entrepreneurial activity in the region. As a result, it is possible to increase the level of employment of the population, to increase its purchasing power and to meet the needs for goods and services of the required quality.

Consequently, to achieve the objectives it is necessary to effectively implement these measures, which will subsequently lead to an increase in budget revenues through tax and non-tax revenues, reduction of budget expenditures and uncompensated revenues, as well as reduction of debt, unprofitability of enterprises and reducing the rate of inflation in the region.

Conclusions

The integral assessment of the financial sustainability of the region is a system of interrelated indicators, characterizing the directions of this development, based on the laws of market economy. The results of this assessment are used by regional authorities for making specific decisions and working out the directions of strategic development of the region.

With the help of the methodology of integral assessment of the financial sustainability of the

region, the regional authorities highlight the problems affecting their current state, determine the degree of impact of each problem, analyze the consequences of their impact and carry out the forecasting of directions of their further sustainable development. The proposed methodology makes it possible to formalize and quantitatively characterize the level of financial sustainability of the region.

On the basis of the conducted calculations on

the example of Donetsk region, the following conclusions can be made:

1. The results of calculating the integral index allowed to determine the type of financial sustainability of the region, which is financially sustainable.

2. The level of financial sustainability has decreased, which indicates the deterioration of the situation that has developed in the region.

The obtained conclusions are the basis for the elaboration of the strategy for sustainable development of Donetsk region.

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