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INNOVATIVE APPROACHES FOR THE EVALUATION AND FORECASTING OF DEBT LEVELS OF THE SECURITY IN UKRAINE

Abstract. Improving the methodology for estimating and forecasting the level of debt security of the country in the medium and long term is of paramount importance for an adequate response to destabilizing factors. Increasing the degree of openness of the national economy, the existing problems of the internal development of the country's economy, significant changes in the global economic space and adjusting the methodological approaches to integrated assessments and forecasting the level of debt security in Ukraine are all of particular relevance. World practice has shown that countries with higher public debt are more vulnerable to changing financial conditions that can actually endanger the economy and contribute to increasing the depth and duration of a recession, given the government's inability to provide sufficient budget to support the economy.

The purpose of this study is to develop innovative approaches to assess and forecast the level of Ukraine's debt security in order to adequately respond to existing destabilizing factors. The use of a methodical approach to estimate and forecast the level of debt security in Ukraine is substantiated. The following indicators are proposed for application in the process of debt security assessment: external debt to annual exports; the ratio of the total amount of external debt servicing payments to the state budget revenue (which is currently considered as an indicator of the state of budgetary security); the ratio of the cost of external debt servicing to annual exports and GDP; the ratio of international reserves to short-term public debt; the share of short-term public debt in its total volume. The state of debt security in Ukraine in 2009—2017 was estimated and a forecast was made for 2018—2020. Modern estimation mechanisms of the state of debt security were studied, their deficiencies were outlined and directions of improvement were proposed. It is shown that the overwhelming majority of Ukraine's debt security indicators are in the critical and unsatisfactory and, moreover, tend to further deterioration. The methodical approach to the estimation and forecasting of the level of debt security of Ukraine, which represents the gradual implementation of the estimation and forecasting of debt security of the state, is highlighted and a list of the most optimal methods for application at each of the stages is grounded.

Keywords: debt security of the state, state debt, debt guaranteed by the state, assessment of the level of debt security of the state, gross external debt, official international reserves.

JEL Classification F34; H63; C60

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ІННОВАЦІЙНІ ПІДХОДИ ДО ОЦІНЮВАННЯ І ПРОГНОЗУВАННЯ РІВНЯ БОРГОВОЇ БЕЗПЕКИ УКРАЇНИ

Анотація. Проаналізовано методику оцінки економічної безпеки України, структурним елементом якої є боргова безпека. Визначено недоліки цієї методики, які можуть призвести до некоректних результатів оцінки стану боргової безпеки, і запропоновано напрями її вдосконалення, серед яких: своєчасний перегляд вагових коефіцієнтів, які чисельно характеризують важливість індикатора; максимальна заміна використання суб'єктивних експертних оцінок у процесі розрахунку вагових коефіцієнтів на користь більш об'єктивних методів (ігрові методи, метод головних компонентів, методи моделювання); систематичне оновлення переліку індикаторів боргової безпеки з урахуванням структурних змін в економіці країни; застосування мультиплікативної форми інтегрального показника стану боргової безпеки замість адитивної форми, серед недоліків якої доцільно виділити значущість інтегрального показника при нульових даних окремих індикаторів, а також компенсація значення інтегрального індексу за певними індикаторами за рахунок інших. Запропоновано до застосування у процесі оцінки стану боргової безпеки такі показники: відношення зовнішнього боргу до річного експорту; відношення обсягу сукупних платежів з обслуговування зовнішнього боргу до доходу державного бюджету; відношення вартості обслуговування зовнішнього боргу до річного експорту і ВВП; відношення міжнародних резервів до короткострокового державного боргу. Оцінено стан боргової безпеки України за період 2009—2017 рр. і доведено, що значення переважної більшості індикаторів боргової безпеки України перебуває в діапазоні критичних і незадовільних значень і, крім того, мають тенденцію до подальшого погіршення. Здійснено прогнозування рівня боргової безпеки України на 2018—2020 рр. шляхом прогнозу

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екзогенних змінних економетричними методами, які є входом для макроекономічної моделі, розрахунку прогнозних значень індикаторів боргової безпеки та інтегрального показника боргової безпеки України в цілому. Обґрунтовано застосування методичного підходу до оцінки і прогнозування рівня боргової безпеки України.

Ключові слова: боргова безпека держави, державний борг, гарантований державою борг, оцінювання рівня боргової безпеки держави, валовий зовнішній борг, офіційні міжнародні резерви.

Формул: 4; рис.: 4; табл.: 3; бібл: 17.

Introduction. In recent years, global world debt has reached a record high, equivalent to 225% of world GDP [12]. Therefore, there is a global tendency to increase both private and public debt, the high level of which limits the ability of states to provide support to the economy in case of a financial crisis or recession. Note that the debt of the public sector plays a significant role in increasing global debt. Considering that the dynamics of the coefficients of the global debt of the public sector is dangerous, which have invariably increased in the last 50 years. Currently, in the market economy countries, public sector debt is predominantly at the level of the debt crisis of the 1980s. In developing countries, public debt has increased 13% over the last five years; in addition, the cost of servicing such debt has significantly increased. Therefore, the average public sector debt to GDP in low-income countries is below historic highs; however, it is necessary to take into account that the debt reduction compared to the maximums is due to different forms of its restructuring.

Improving the methodology for estimating and forecasting the level of debt security of the country in the medium and long term is of paramount importance for an adequate response to destabilizing factors. Increasing the degree of openness of the national economy, the existing problems of the internal development of the country's economy, significant changes in the global economic space and adjusting the methodological approaches to integrated assessments and forecasting the level of debt security in Ukraine are all of particular relevance.

Literature review and the problem statement. Problems in estimating and forecasting the level of debt security of the state in recent years have been actively investigated by domestic and foreign scholars such as J. Donaldson and E. Micheler (2018) the process of analysis of redistributed debt and systemic risk [1]; M. Grobety (2018) — under assessing public debt and increasing the role of liquidity [2]; M. Nagano (2018) — at the research stage of the factors of influence on the issue of producing bonds [3]; J. Montgomeriea and D. Tepe-Belfrage (2018) — in searching for a link between the level of debt sustainability and modern financial policy [4]; Ch. Tee (2018) — proving the connection between the value of public debt and political ties (for example, in Malaysia) [5]; M. Fratianni and F. Marchionne (2017) — at the stage of analysis of redistribution of banking assets and sovereign debt [6]; J. Li, Sh. Lin and Sh. Tucker (2018) — in the process of studying the structure of debt [7]; F. Roch and G. Uhlig (2018) — during presentation of the dynamics of sovereign debt and directions of its management [8]; Y. Xarazishvili (2014) — at the stage of improving methodological approaches for assessing the level of economic security [10]; L. Omelchenko, I. Sumina (2012) — in the process of analyzing the condition of debt security in Ukraine [13] and many others.

The above-mentioned scientific works are considered the essence of debt security at the state level, methodological approaches for assessing its level, however, in the context of increasing the degree of openness of economies, the existence of problems with repayment and servicing of external debt in many countries of the world and the existence of objective gaps in available approaches to evaluate the level of debt security, which restricts the possibilities of their application, we consider it is necessary to develop innovative approaches to assess and forecast the level of debt security in Ukraine.

The purpose of this study is to develop innovative approaches to assess and forecast the level of Ukraine's debt security in order to adequately respond to existing destabilizing factors.

Research results. Omelchenko L. and Sumina I. note that it is appropriate to consider state debt security as the optimum balance between borrowings (internal and external) taking into account certain indicators such as the cost of servicing and the total amount of public debt [13].

The basic methodology of the Ukrainian Ministry of Economic Development and Trade [9], which is «informative, advisory, explanatory and not obligatory», is a basic methodology that in the legislative and regulatory space highlights the mechanisms for assessing the economic security of Ukraine, the structural element of which is debt security. According to the methodology, the country's debt security is considered as the appropriate level of debt (internal and external), sufficient to meet socio-economic needs, taking into account the efficiency of using borrowings (internal and external), the cost of servicing public debt that does not threaten the financial system and state sovereignty, ratios between structural elements of indebtedness [9] and is an integral part of Ukraine's financial security, along with banking security, non-banking security financial sector (the level of the stock markets and insurance), fiscal, monetary and currency security.

In order to assess the level of economic security, it is proposed to assess the state of the nine components of economic security (their integral indices) by analyzing the values of a set of indicators selected according to the principles of reliability, representativeness and information accessibility. The debt security of Ukraine according to the Methodology [9] is characterized by a set of 5 numerical indicators, which can be highlighted in the form of a vector $\overline{DS_j} = \{x_{1j}, x_{2j}, x_{3j}, x_{4j}, x_{5j}\}$.

The complex of indicators (components of the vector) is partly based on statistical data, and partly is based on the data obtained by the expert estimation method. Note that for each of the indicators of the state of economic security, the set of which is divided into three types, depending on their economic content (stimulants (C), stimulants (B), mixed (A)), the ranges of characteristic values are defined.

Considering that the components of the vector should be dimensionless, the values of the system of indicators which have different dimensions and are multi-directional are obtained, then the dimension of the interpretations and information unidirectional by the valuation of the indicators of various dimensions, that is, the conversion of the dimensionless quantities to the fixed range [0,1]. Nomination provides the possibility of comparing very different indicators and may take various methods based on the comparison of absolute values of indicators with certain values (optimal, maximum, minimum and threshold).

In Methodology [9; 17] for the standardization of the status indicators of debt security (and other components of economic security) it is proposed to apply the method of valuation — relative to the scope of variation:

$$C: y_{ij} = \frac{x_{ij} - x_{\min}}{x_{\max} - x_{\min}}; B: y_{ij} = \frac{x_{\max} - x_{ij}}{x_{\max} - x_{\min}}, \quad (1)$$

where C — indicator-stimulator; B-disinfectant indicator; y_{ij} — the normalized value of the i-th indicator of the debt security status in j period; x_{max}, x_{min} — threshold values of the i-th indicator of the debt security status in the appropriate range of characteristic values.

To determine the threshold values of a certain range of values of indicators of the state of debt security, it is expedient to use the following methods: macroeconomic models; functional dependencies; nonlinear dynamics; stochastic; heuristic; methods of expert assessments; legislative approach.

According to Y. Harazishvili [10], the method of valuation according to the scale of variation does not fully enable it to give characteristics of the variation of the characteristic due to the fact that the method does not take into account the frequencies and all the values of the investigated feature that are intermediate between the thresholds in this range of characteristic values. Thus, the scale of variation actually depends only on the threshold values of the range, which may not be sufficiently representative, which ultimately reduces the scope of effective

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practical application of the variation scale. This remark leaves open the question of improving the valuation methods indicators for the state of debt security in determining the integral index. Also, in the process of valuation of Ukraine's debt security indicators, a simpler method can be used compared to the valuation method in relation to the scope of the variation (2).

$$C: y_{ij} = \frac{x_{ij}}{k}, k \geq x_{\max}; B: y_{ij} = \frac{k}{x_{ij}}, k \leq x_{\min}. \quad (2)$$

However, with the application of this method of valuation, questions arise as to the choice of the reference coefficient k. Thus, using the average aggregate value as a coefficient of k, the values of normalized indicators may exceed 1, which violates the need to comply with the indicators in the range [0; 1], and secondly, given the current tendency for a significant deterioration in the values of the indicators of the state of debt security, their average value, in our opinion, cannot be considered as a certain objective indicator for comparison.

The methodology for calculating the state of economic security [9] also suggests the use of weight ratios for each of the indicators that numerically characterize the importance of a particular indicator in comparison with other indicators. Thus, certain normative indicators of debt security are summarized by means of weighting coefficients in the integral value of the debt security of the country as a whole. There is a question as to which methods can be used to determine the importance of a particular indicator, i.e. how weight ratios are calculated. Frequently weighted coefficients are determined using rather subjective expert assessments (including the method of pairwise comparisons), which can significantly reduce the effectiveness of assessing the level of debt security. In our opinion, weights should be systematically reviewed in the light of changes in the economic situation in the world and structural changes in the national economy [16].

Taking into account the presence of certain shortcomings of expert assessments in the process of calculating the weight coefficients of indicators of debt security, it is expedient to use other formalized methods that are devoid of subjectivity, namely: game techniques; main component method; modelling methods.

After determining the weights, the "linear convolution" (the method of weighted sum, the additive function of utility) is used by forming the sum of the criteria multiplied by a certain weighting factor (3).

$$DS_j = \sum_{i=1}^{5} a_i y_{ij}, \text{ where } \sum_{i=1}^{5} a_i = 1 \quad \text{and} \quad a_i \geq 1, \quad (3)$$

where DS_j — the level of Ukrainian debt security in j period; a_i — weight factor of the i-th indicator of state debt security.

We consider the scientific position of Y. Kharazishvili to be relevant to the existence of certain deficiencies in the application of the most common additive form of the integral index of the state of bory security [10], namely the possibility of the significance of the integral indicator of debt security conditions, provided that the null data of individual indicators is compensated, as well as the compensation of the value of the integral indicator for certain indicators for account of others.

Taking into account the nonlinearity of economic processes, it is more appropriate to apply the multiplicative form of the integral indicator of debt security status (4).

$$DS_j = \prod_{i=1}^{5} y_{ij}^{a_i} \text{ where } \sum_{i=1}^{5} a_i = 1 \quad \text{and} \quad a_i \geq 1. \quad (4)$$

Methodological recommendations [9] for assessing the status of debt security offer to use 5 indicators of its status, namely:

– ratio of the state and guaranteed by the state debt to GDP, %;
– ratio of gross external debt to GDP, %;
– average weighted yield of domestic government bond bonds in the primary market, %;
– EMBI (Emerging Markets Bond Index) + Ukraine;
– the ratio of official international reserves to the volume of gross external debt, %.

We will analyze the significance of the above-mentioned indicators in 2009—2017 and generalize the normalized indicators in the integral index of the debt security status for further forecasting in the medium-term perspective. The input data for the definition of the debt security indicators offered by the Ukrainian Ministry of Economic Development and Trade is presented in the *Table 1*.

Table 1

Input data for determining the indicators of the state of debt security in Ukraine, 2009—2017

Indicator	Years								
	2009	2010	2011	2012	2013	2014	2015	2016	2017
State and State-guaranteed debt of Ukraine, UAH billions	316,9	432,2	473,1	515,5	584,1	1 100,6	1 572,2	1 929,8	2141,7
GDP, billion UAH	913,3	1 082,6	1 316,6	1 408,9	1 454,9	1 566,7	1 979,5	2 383,2	2 982,9
Gross External Debt of Ukraine, billion US dollars	103,4	117,3	126,2	135,1	142,1	126,3	118,7	113,5	116,6
GDP, billion US dollars	117,2	136,4	163,2	175,8	183,3	131,8	90,6	93,3	106,3
Official International Reserves, US $ Billion	26,5	34,6	31,8	24,5	20,4	7,5	13,3	15,5	18,8

Source: summarized by the authors according to the data of the State Statistics Service of Ukraine [11].

So, analyzing the data in table 1, we note that the total value of the state and guaranteed by the state debt, that is, the total debt obligations of the country to all creditors, including foreign countries, legal entities, individuals, international organizations, has a steady tendency to increase (from UAH 316.9 billion in 2009 to 2141.7 billion UAH in 2017). The public debt consists directly of the arrears of regional and local authorities and central government, as well as corporate debt with state participation, in proportion to the share of the state in their capital.

In our opinion, the dynamics of the gross domestic product of Ukraine should be analyzed simultaneously in the national currency and US dollars. Let's highlight the graphically calculated GDP figures for 2009—2017 in *Fig. 1*.

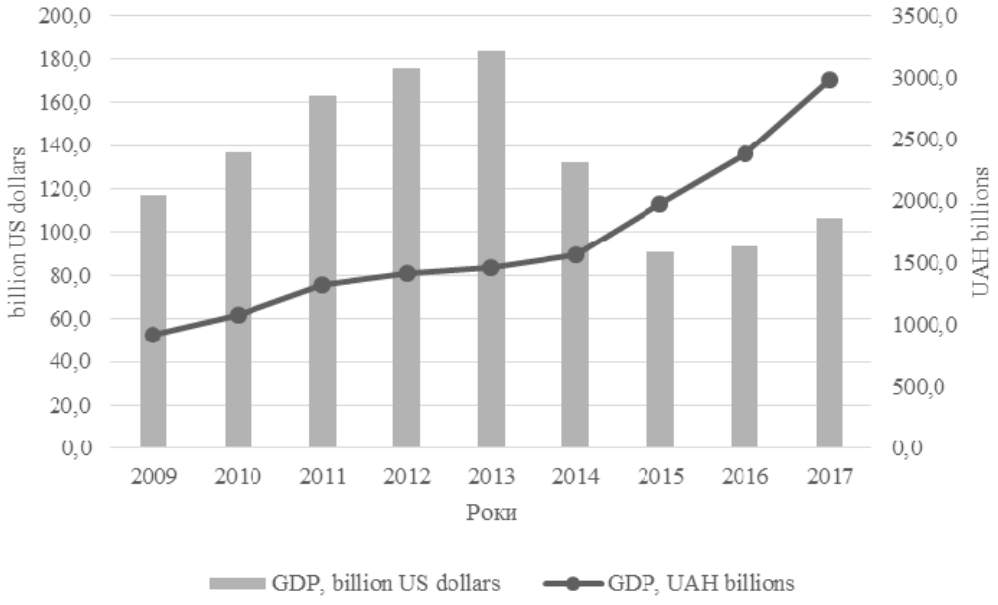

Fig. 1. Dynamics of GDP of Ukraine for 2009—2017

Source: summarized by authors based on data from the State Statistics Service of Ukraine [11].

Analyzing the data of *Fig. 1*, it is worthwhile to draw attention to the fact that the GDP of the country, calculated in the national currency, has a steady tendency for growth (from UAH 913.3 billion as of the results of 2009 to UAH 2982.9 billion in 2017). Ukraine's GDP, measured in US dollars, steadily increased during 2009—2013 (from $ 117.2 billion in 2009 to $ 183.3 billion in

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2013), in 2014 the figure fell to 131, $ 8 billion or 28% compared to 2013. During 2015—2017, the survey figure did not exceed the 2009 crisis value, ranging from $ 90.6-106.3 billion.

Using statistical data, highlighted in *Table 1*, we will calculate the absolute values of the indicators of the state of Ukrainian debt security and present them in the *Table 2*.

Table 2

Absolute Indicators of Ukraine's Debt Security Status, 2009—2017*

Indicator	Years								
	2009	2010	2011	2012	2013	2014	2015	2016	2017
The ratio of the state and state-guaranteed debt to GDP,% (x_1)	34,69	39,93	35,94	36,59	40,15	70,25	79,42	80,97	71,80
The ratio of gross external debt to GDP,% (x_2)	88,20	86,02	77,37	76,84	77,51	95,83	131,03	121,71	109,69
Average weighted yield of domestic government bond bonds in the primary market,% (x_3)	12,21	10,39	9,17	12,94	13,13	13,44	13,07	9,16	10,47
The ratio of official international reserves to the volume of gross external debt,% (x_5)	25,63	29,47	25,19	18,17	14,37	5,96	11,20	13,69	16,13

Source: summarized by the authors according to the data of the State Statistics Service of Ukraine [11].

It should be noted that in international practice, the ratio of the state and state-guaranteed debt to GDP (*x*1) is the main criterion for assessing debt security. Western financial science offers two approaches to assessing the level of government debt sustainability:

– the state debt position is stable if the indicated indicator tends to decrease or remains unchanged;

– ensuring the government debt sustainability in the long run requires the containment of the growth rate of public debt, rather than limiting its overall level.

The analytical data presented in *Table 2* indicate that the ratio of the amount of state and state-guaranteed debt to GDP of Ukraine increased from 34.7% in 2009 to 71.8% in 2017, exceeding the legislatively set threshold (critical) level by almost 12%.

The ratio of gross external debt to GDP of Ukraine in 2009—2017 also increased from 88.2% in 2009 to 109.7% in 2017, which confirms that during the entire period of the study, the value of the indicator exceeds the statutory threshold (critical) values (70%) and are in the range of critical values.

International practice also analyzes the level of external debt per person. Note that the external debt of Ukraine per capita increased from $ 1,161.6. US in 2006 to $ 2744.0 According to the results of 2017 or 2.36 times.

We draw attention to the fact that the Methodology [9] states that the review of the complex of indicators of the state of economic security (and, accordingly, its components, including debt security) and intervals of their characteristic values should be carried out if necessary, but not less than once every five years. At the time of the study, no changes were made to the system of indicators developed in 2013, although it should be noted that there have been significant changes in the national economy that require some adjustments in the methodology for assessing the state of the country's economic security.

In April 2018, in the form of a standardized interview, an expert evaluation was conducted, in which 35 experts participated. The aim of the study was to systematize information on the specifics of the state of certain areas of the country's economy, to distinguish external and internal threats to its financial security, to define the hierarchy of influences and regulatory measures. The information obtained as a result of expert evaluation provided an opportunity to use, among other things, average expert assessments in the process of submitting proposals for improving the methodology for assessing the state of financial security of Ukraine and its components.

The system of debt security indicators is not constant, it can be changed and supplemented both in the part of the set of indicators directly and in relation to their thresholds in the respective ranges and weighting factors, however, based on the principles of adequacy, complexity, hierarchy, continuity and unambiguousness.

In our opinion, in the process of assessing the state of debt security, it is also advisable to analyze the following indicators: the ratio of external debt to annual exports; the ratio of the total amount of external debt servicing payments to the state budget revenue (which is currently considered as an indicator of the state of budgetary security); the ratio of the cost of external debt servicing to annual exports and GDP; the ratio of international reserves to short-term public debt; the share of short-term public debt in its total volume.

Taking into account that the legally recommended indicator of Ukraine's debt security status (index EMBI + Ukraine) is not defined in international practice, starting from 2014, it is proposed to replace it with the indicator of long-term sovereign credit rating of Ukraine determined by the reputable international rating agency Standard & Poor's. The indicated indicator is a stimulator; therefore, we represent its characteristic values in *Fig. 2*.

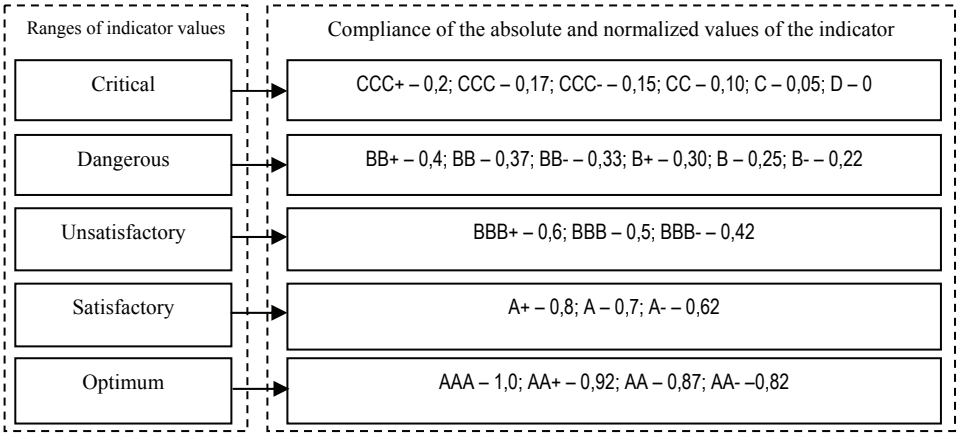

Fig. 2. Characteristic values of Ukraine's debt security indicator: long-term sovereign credit rating formed by the international rating agency Standard & Poor's

Source: developed by the authors.

Calculated normalized indicators and the integral indicator of Ukraine's debt security in *Table 3*.

Table 3

Normed values of indicators and integral indicator of Ukraine's debt security status, 2009—2017

Indicator, weighted coefficient	Years								
	2009	2010	2011	2012	2013	2014	2015	2016	2017
x_1, weighted coefficient — 0,2195	0,71	0,60	0,68	0,67	0,60	0,20	0,18	0,17	0,19
Range of indicator value x_1	$x_{satis} \le x_{1j} < x_{unsat}$				$x_{unsat} \le x_{1j} < x_{dang}$	$x_{1j} \ge x_{crit}$			
x_2, weighted coefficient — 0,2214	0,16	0,16	0,18	0,18	0,18	0,15	0,11	0,12	0,13
Range of indicator value x_2	$X_{2j} \ge x_{crit}$								
x_3, weighted coefficient — 0,183	0,18	0,26	0,38	0,17	0,17	0,16	0,17	0,38	0,25
Range of indicator value x_3	$x_{3j} \ge x_{crit}$	$x_{dang} \le x_{3j} < x_{crit}$		$X_{3j} \ge x_{crit}$				$x_{dang} \le x_{3j} < x_{crit}$	
x_4, weighted coefficient — 0,1778	0,30	0,33	0,30	0,30	0,22	0,20	0,10	0,22	0,22
x_5, weighted coefficient — 0,1983	0,27	0,32	0,26	0,18	0,14	0,06	0,11	0,14	0,16
Range of indicator value x_5	$x_{crit} \le x_{5j} < x_{dang}$			$0 < x_{5j} < x_{crit}$					
Integral Debt Security Status (DS)	0,33	0,34	0,37	0,31	0,27	0,15	0,13	0,20	0,19

Source: calculated and supplemented by the authors.

Analytical data of *Table 3* indicate that the values of the integral index of the country's debt security (DS) throughout the research period are, firstly, in the range of unsatisfactory and critical values, and secondly, they tend to decrease.

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To predict the level of debt security in Ukraine, it is necessary, firstly, to make a forecast of econometric methods of exogenous variables that are inputs for a macroeconomic model, and as a result we obtain forecasted macroeconomic indices for calculating the forecast values of the indicators of the debt security status and, accordingly, the integral indicator of Ukraine's debt security. We agree with the opinion of Y. Harazishvili regarding the priority of forecasting the level of security of the country by means of macroeconomic models [10].

Graphically, we present the normalized values of debt security indicators (x1—x5) and the integral index of debt security (DS) for 2009—2017 and projected values for the years 2018—2020 (*Fig. 3*).

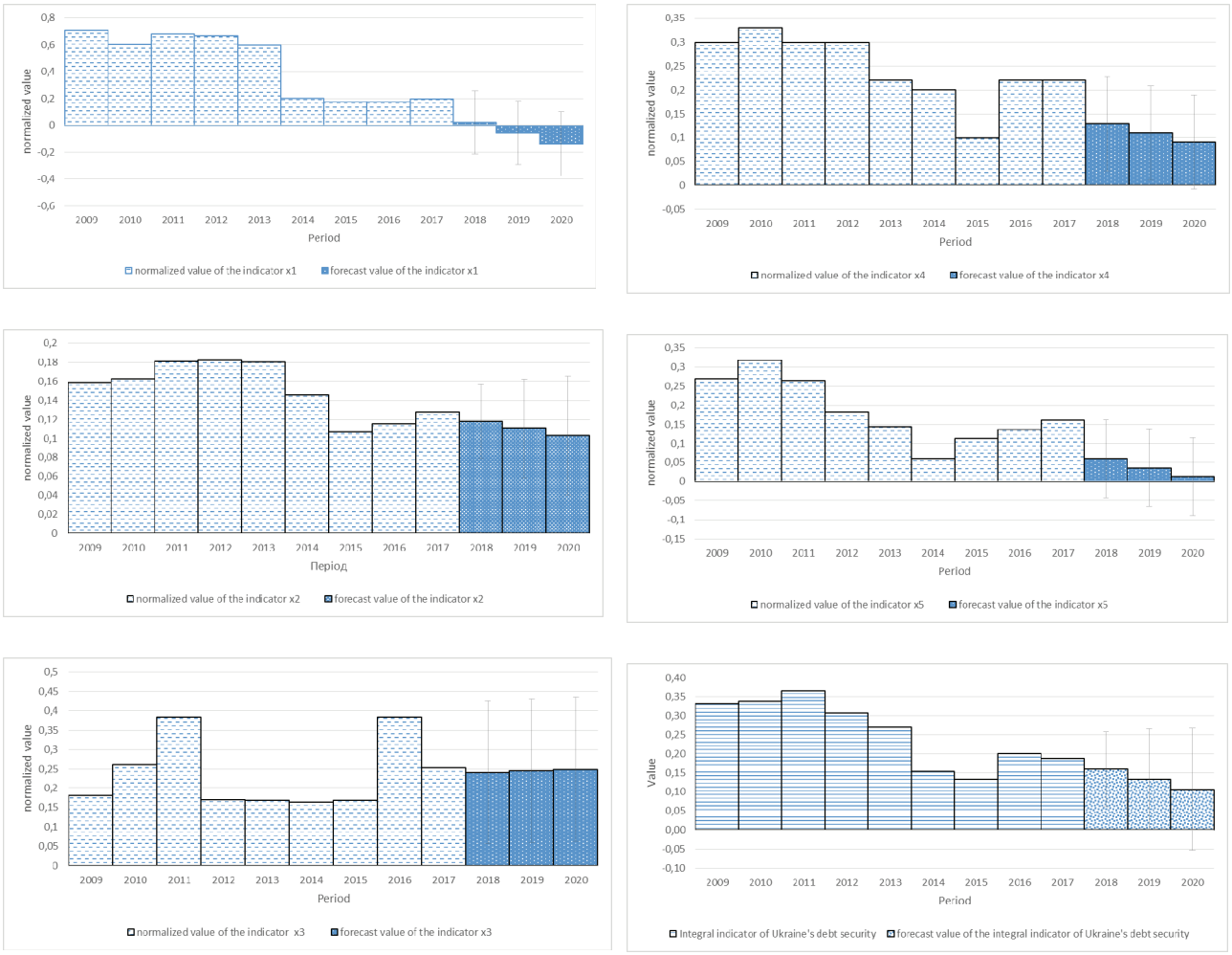

Fig. 3. Normed values of debt security indicators (x1—x5) and the integral index of debt security status (DS) for 2009—2017 and their projected values for 2018—2020

Source: calculated by the authors;

So, we will highlight a methodological approach to assessing and forecasting the level of debt security in Ukraine (*Fig. 4*).

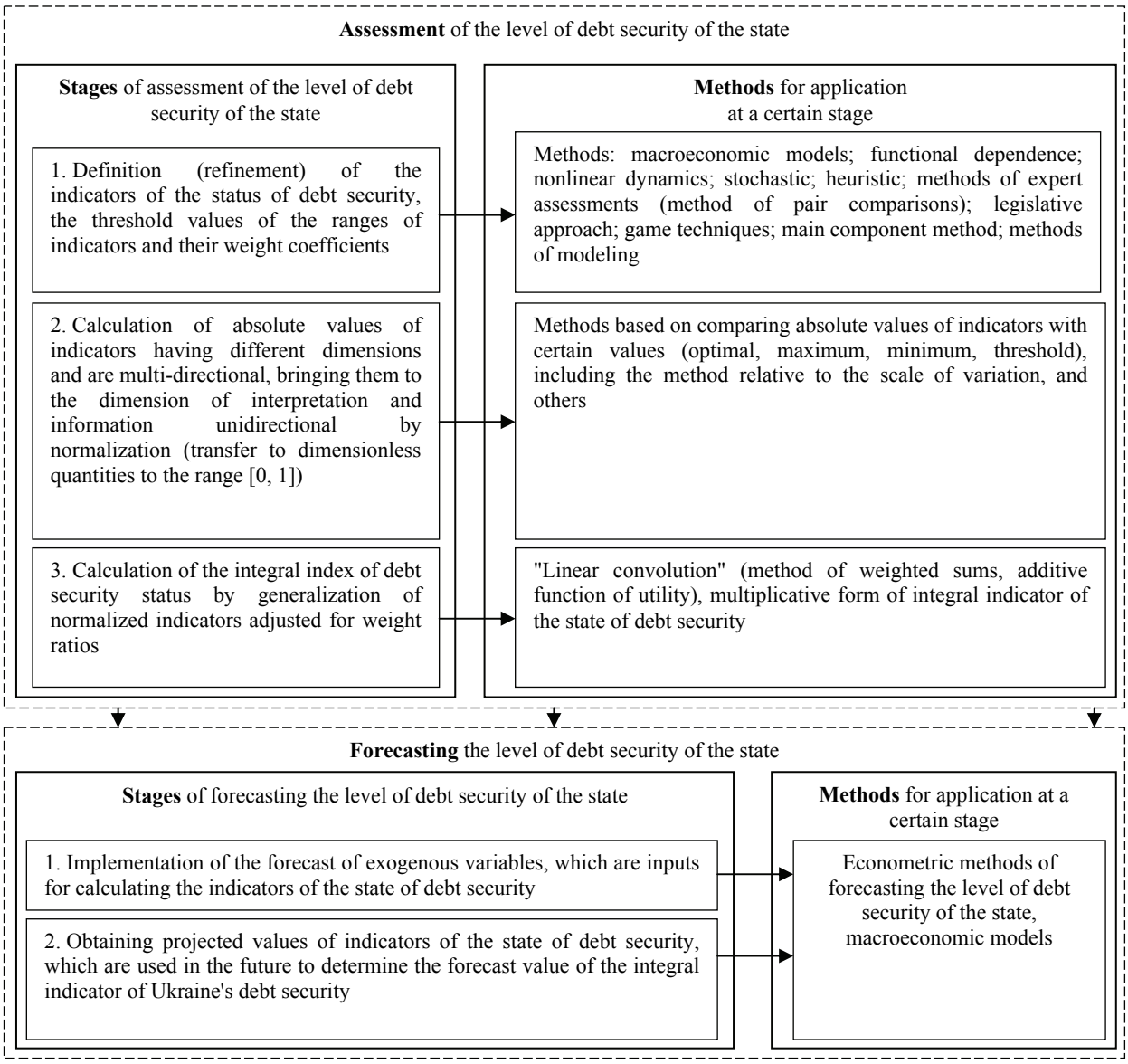

Fig. 4. Methodological approach to the assessment and forecasting of the level of debt security in Ukraine

Source: developed by the authors on the basis of [14; 15].

Conclusions. In the process of developing an innovative approach to the assessment and forecasting of the level of debt security in Ukraine, the following conclusions were formulated:

1. World practice has shown that countries with higher public debt are more vulnerable to changing financial conditions that can actually endanger the economy and contribute to increasing the depth and duration of a recession, given the government's inability to provide sufficient budget to support the economy.

2. An analysis of the global tendency to increase both private and public debt, the high level of which limits the ability of states to provide support to the economy in the event of a financial crisis or recession. We consider the dynamics of the coefficients of the global debt of the public sector, which have been rising steadily over the past 50 years, as threatening.

3. The methodology of the Ukrainian Ministry of Economic Development and Trade, which in the legislative and normative space of Ukraine is the main methodology that highlights the mechanisms of assessing the economic security of Ukraine, the structural element of which is debt security, is investigated. The drawbacks of this methodology that may lead to incorrect results of the assessment of the debt security status are outlined, and directions for its improvement are proposed, among which:

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– timely review of weighting factors that numerically characterize the importance of a particular indicator compared to other indicators of debt security;

– maximum replacement of the use of subjective expert assessments in the process of calculating weighting factors in favor of more objective methods (game methods, the method of the main components, modelling methods);

– systematic updating of the list of indicators of the state of debt security taking into account structural changes in the national economy (including the replacement of the indicator by the index EMBI + Ukraine on the indicator of the sovereign credit rating of Ukraine, determined by the authoritative international rating agency Standard & Poor's);

– application of the multiplicative form of the integral index of the state of debt security instead of the additive form, among the disadvantages of which it is expedient to highlight the significance of the integral indicator, provided that the null data of individual indicators is compensated, as well as the compensation of the value of the integral index for certain indicators at the expense of others.

4. The following indicators are proposed for application in the process of debt security assessment: external debt to annual exports; the ratio of the total amount of external debt servicing payments to the state budget revenue (which is currently considered as an indicator of the state of budgetary security); the ratio of the cost of external debt servicing to annual exports and GDP; the ratio of international reserves to short-term public debt; the share of short-term public debt in its total volume.

5. The state of debt security of Ukraine for the period of 2009—2017 is estimated and it is proved that the value of the overwhelming majority of Ukraine's debt security indicators is in the range of critical and unsatisfactory values and, moreover, tend to further deteriorate.

6. The forecast of the level of debt security of Ukraine for 2018—2020 by forecasting exogenous variables by econometric methods, which is the input for the macroeconomic model, calculation of the forecast values of the indicators of the state of debt security and the integral indicator of debt security of Ukraine as a whole, is carried out.

7. The methodical approach to the estimation and forecasting of the level of debt security of Ukraine, which represents the gradual implementation of the estimation and forecasting of debt security of the state, is highlighted and a list of the most optimal methods for application at each of the stages is grounded.

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