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АНАЛІЗ СТІЙКОСТІ СИСТЕМИ ДЕРЖАВНИХ ФІНАНСІВ УКРАЇНИ У СЕРЕДНЬОСТРОКОВІЙ ПЕРСПЕКТИВІ

Анотація. Розбалансована фіскальна політика призводить до кризи суверенного боргу, який в довгостроковій перспективі створює тиск на економіку країни. Аналіз динаміки зростання пенсійних витрат та прогнозних демографічних показників, підтверджує вплив старіння населення на динаміку стійкості державних фінансів України. В результаті розрахунків, індикатор S1 в 2021 р. складе 7,8, що характеризує критично високий ступінь ризику стану державних фінансів. Найбільший вплив чинить фактор А (5,091% ВВП), відображаючи рівень державного боргу та структурного дефіциту. Фактором стабілізації державних фінансів в середньостроковій перспективі розглядається оптимізація пенсійних витрат.

Ключові слова: система державних фінансів України, стійкість державних фінансів, старіння населення, індикатор S1.

Формул: 2; рис.: 2; табл.: 2; бібл.: 19.

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FISCAL SUSTAINABILITY ANALYSIS WITHIN MEDIUM TERM IN UKRAINE

Abstract. Unbalanced fiscal policy leads to a crisis of sovereign debt, which subsequently has a long pressure on the economy. The paper studied the sustainability of public finances in the medium term Ukraine using S1 fiscal sustainability indicator. Until 2021 the future growth of the ratio of people of retirement age to employable can reach 45%, which will increase social expenditures, and given the high debt burden, create a risk for public finances. Analysis of the dynamics of pension expenditure growth and predicted demographic indicators allows revealing the impact of the age of population on the sustainability dynamics of public finance in Ukraine. As a result of calculations, the S1 indicator on the 2021 will be 7. 8, indicating a high degree of critical public finance risk. The greatest impact has the component A (5. 091% of GDP), reflecting the impact of the public debt level and the primary structural deficit. Component B (1. 252% of GDP) represents the sum of its annual growth. Component C (1,393% of GDP) determines the necessary adjustments to reach the target level of debt and is characterized by the negative effects of tax policy changes on the fiscal gap level. Component D (0,018% of GDP) has no significant impact on the indicator S1. The factor of stabilization of public finances in the medium term is considered of

the optimization of pension expenditures. Further research will consider the development of proposals to increase the sustainability of public finances.

Keywords: public finance system of Ukraine, public finances sustainability, an aging population, the S1 indicator.

JEL Classification: E62, H60, H61, H63

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АНАЛИЗ УСТОЙЧИВОСТИ СИСТЕМЫ ГОСУДАРСТВЕННЫХ ФИНАНСОВ УКРАИНЫ В СРЕДНЕСРОЧНОЙ ПЕРСПЕКТИВЕ

Аннотация. Разбалансированная фискальная политика приводит к кризису суверенного долга, что впоследствии оказывает длительное давление на экономику страны. Анализ динамики роста пенсионных расходов и прогнозных демографических показателей позволяет вывить влияние старения населения на динамику устойчивости государственных финансов Украины. В результате расчетов, индикатор S1 на 2021 г. составит 7,8, что говорит о критически высокой степени риска государственных финансов. Наибольшее воздействие оказывает фактор А (5,091% ВВП), отображая влияние уровня государственного долга и первичного структурного дефицита. Фактором стабилизации государственных финансов в среднесрочной перспективе рассматривается оптимизация пенсионных расходов.

Ключевые слова: система государственных финансов Украины, устойчивость государственных финансов, старения населения, индикатор S1.

Формул: 2; рис.: 2; табл.: 2; библи.: 19.

Problem formulation. The current economic situation in Ukraine determines the need for a significant focus on issues of sustainable economic growth, measures to return to the macroeconomic parameters that were before modern structural crisis.

Problems such as deteriorating fiscal positions of Ukraine and the rapid increase in public debt, together with increased budgetary pressures pose particularly acute authorities the issue of public finances sustainability, as for Ukraine is very important at this stage to be able to develop appropriate measures. Thus, the public finance system needs research in the short and medium term periods.

Exploring the medium term financial problems through the prism of the tax gap can claim direct communication with exceeding projected government spending, including estimated costs associated with changes in the age structure of the population (particularly on pensions, health and social protection in the long term period). Given this, in this article we consider public finances sustainability in the medium term in the light of the aging population impact.

Analysis of recent researches and publications. The issues of public finances stability is constantly engaged by experts of the European Commission [1-4] as well as experts of the International Monetary Fund [5-8], developing methodological approaches for determining the structure of such finances and their evaluation indicators. An important contribution to problem researching was made by S. S. Gasanov, R. L. Balakin [8], I. V. Bogdan [10], V. P. Kudryashov [11], which considered the content of the public finances stability and its performance, also I. I. Umanskiy [12], who has researched the public finances stability in terms of present European integration processes.

Setting objectives. So, in this article we aim to research public finances sustainability within medium term in Ukraine, focusing on the analysis of the public finances aging population factors.

Presenting main material. The analysis of scientific sources showed that the concept of «sustainability» reflects the specific features and aspects of various phenomena and processes not only in the public finance sector but also in society, the state and the environment in general. Based on shared characteristics, main features for sustainability are: reliability - the ability to maintain the consistency of vital functions, adaptability - the ability to adapt to changes and external factors, the ability to self-organization - maintain the permanence of system-parameters.

The issue of medium term public finances sustainability is advisable to research through the volume and structure of public expenses. Public expenses during the economic crisis, restoring of economic growth, sustainable development and strategic reforms implementations are different from each other.

According to the Pension Fund of Ukraine data, pension spendings is growing: the transferred amount for January – October, 2015 reached 126 712 mln. UAH and the transferred amount for January – October 2016 reached 130 113 mln. UAH. (See Figure. 1).

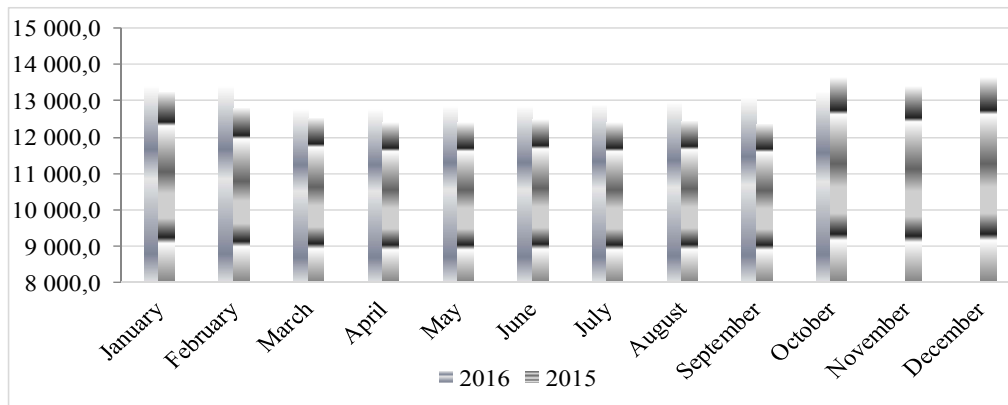


Fig. 1. Dynamics of pensions increase through current bank accounts of pensioners and beneficiaries during 2015-2016 years, mln. UAH.
Source: based on [13–14].

The increase in government expenditure on pensions suggests the significance of the impact of such factors as «the number and age structure of the population» for state finances. Because of the impact importance of these factors on the economy, conducted a lot of research about the the demographic system functioning, self-renewal features of the population as its main component and ability to influence the efficiency of state institutions as a whole and its individual components.

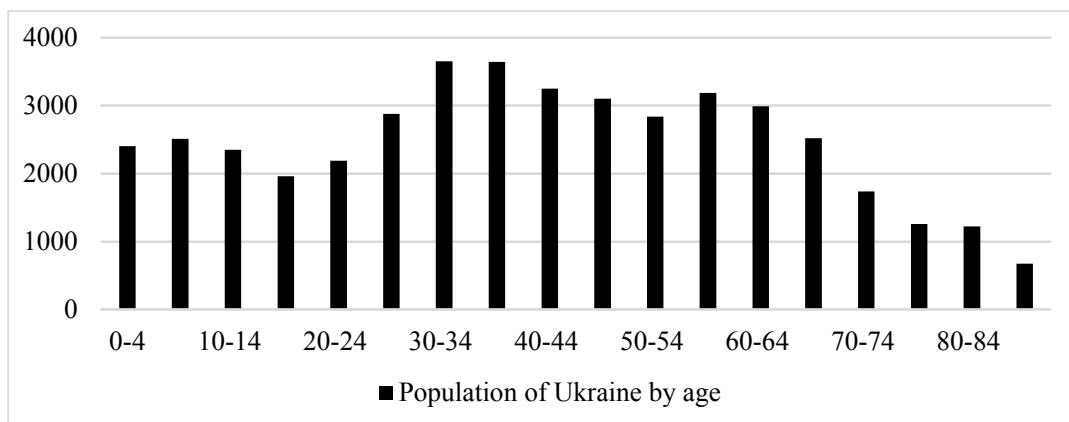


Fig. 2. Forecast for the population of Ukraine under conditions of medium fertility, life expectancy and net migration in 2020
Source: built according to [15] (in terms of average fertility).

Ukraine is among the countries with relatively high level of population aging and in the coming decades this process is going to progress rapidly. According to the forecast of average fertility, life expectancy and net migration in 2020 the proportion of women aged 65 and older will be 20.1% of the female population of Ukraine, men – 12.2% respectively.

With the increasing aging population in Ukraine (increase of the population aged 60 years and older) the demographic pressure is exacerbated on the workforce.

The financial and economic impact of demographic aging, particularly its impact on the social security system, most clearly demonstrate the indicators which characterize the ratio of elderly (in international comparisons usually these include persons aged 65 years and older) and the working age population (in international comparisons usually 14–64 years).

Depending on the combination, it may be an indicator of the burden on the population elderly (old-age dependency ratio – the population aged 65 and over in relation to the population aged 15–64 years), or indicator of potential support older people can count on (potential support ratio – the population aged 15–64 years in relation to the population aged 65 years and older). For average-case forecast of the Demography and Social Studies Institute of M. V. Ptukha National Academy of Sciences of Ukraine, in 2021 in Ukraine elderly loading to labor pool will rise from 22% to 45%, when potential support ratio will decrease from 4,6 to 2,3 respectively. If we take the age limits of working age not under international standard (15–64 years) but taking into account national legal and economic realities, labor activity age range narrows to 20–59 years. Because of this, situation is even more dramatic: load indicator (60+ / 20–59), which is currently 36%, by the end of the forecast period will increase to 65%, the rate of potential support (20-59 / 60+) - decrease from 2,8 to 1,5.

According to M. Eyras in a country with a high proportion of the elderly population, the overall demand for education will decrease and the demand for health services will increase. Thus, government spending on social security and medical care will be higher than the cost of education or other forms of development [16].

Experts of IMF and World Bank used different approaches to build models of early warning to forecast currency crisis, the main ones being: indicators developed by G. Kaminsky and model “probit-logit”, models of limited dependent variables [17]. The proposed technique can be used to evaluate the vulnerability of the budget system.

Thus, predicting the stability of public finances is impossible without appropriate indicators. In this article, exploring the medium-term stability, we will consider the indicator S_I . S_I indicator is constructed so that the adjusted state debt will reach its target value to the reference date. In particular, the present value of the acceptable debt coefficient for EU member states considered as 60% of GDP in 2030 [3]. Implementation of assessment methodology similar to Europe is important for Ukraine, it will create an opportunity not only to calculate the volume of fiscal gaps, but also to identify the causes of their formation. The results can be used to develop measures for identified targets and allows to calculate the amount of necessary financial resources to achieve its goals.

In general, the S_I quantitatively identifies fiscal gap, which must be eliminated by the government in the medium term to restore the sustainability of public finances. The higher the value of S_I , the greater the structural adjustment of the primary balance needed to ensure their stability [6].

Mid-term indicator of fiscal sustainability indicates the magnitude of the fiscal adjustment in terms of improving the structural primary balance of the general government, which will be implemented in a specific period (for ex. until 2020) and will provide an opportunity to reduce the national debt to a certain level relative to GDP (for ex. to 60% of GDP) in a given year (as well in 2020). This amount includes funding for any additional costs that arise from the aging of the population by the end of the forecast period [10].

The formula for calculating S_I sustainability indicator is as follows:

$$S_I = \frac{D_{t_0}(\alpha_{t_0,t_2}-1)}{\sum_{i=t_0+1}^{t_2}(\alpha_{i,t_2})} - PB_{t_0} - c \frac{\sum_{i=t_0+1}^{t_2}((t_1-i)\alpha_{i,t_2})}{\sum_{i=t_0+1}^{t_2}(\alpha_{i,t_2})} + \frac{(D_{t_0}-D_{t_2})}{\sum_{i=t_0+1}^{t_2}(\alpha_{i,t_2})} + \frac{\sum_{i=t_0+1}^{t_2}(\Delta A_i \alpha_{i,t_2})}{\sum_{i=t_0+1}^{t_2}(\alpha_{i,t_2})} \quad (1)$$

r - the difference between the nominal interest rate of government debt service and the rate of change of nominal GDP; D_{t-1} - gross government debt in the year preceding the start of the long-term forecast, % of GDP; S_{t-1} - primary structural balance of the general government in the year preceding the start of the long-term forecast, % of GDP; i - the forecast years, chosen for the research; ΔS - annual increase in the structural primary balance in the financial regulation (between $t_0 + 1$ and $t_0 + 2$) (true for S_1); DT - gross state debt in the last year of the forecast period; ΔS_{pop} - change in the structural primary balance of government sector caused by rising costs associated with the aging of the population, compared to the base year, % of GDP; $T = t_1 = t_2$ - the last year of the forecast period specified for analysis; t_0 - the year preceding the start of the long-term forecast (year which not included in the horizon of a long-term forecast, means the previous year with known actual statistics); $t_0 + 1$ - the year of the beginning of fiscal adjustment; t_1 - the year end of fiscal adjustment, 2020 in our case; t_2 - the year of reaching the target level of general government debt in 2021; D_{t_0} - gross debt of general government, % of GDP at end of period t_0 ; α_{t_0, t_2} - discount multiplier or cumulative multiplier calculated as $(1 + r_{t_0+1}) * (1 + r_{t_0+2}) * (1 + r_{t_0+3}) * \dots * (1 + r_{t_2})$;

This r difference is calculated using the equation:

$$1 + r = \frac{1+R}{1+G}, \quad (2)$$

where R and G - the nominal interest rate and the growth rate of nominal GDP respectively.

The choice of threshold for S_I indicator associated with the threshold value of the debt that is set by Treatment of the Functioning of the European Union.

The formula of fiscal sustainability indicator S_I can be divided into the following four components: $S_I = A + B + C + D$.

Component A measures the effect of public debt starting level and primary structural deficit by the amount of public finance deficit, presented as structural primary balance (PB).

Component B shows the size of the fiscal adjustment, required to reduce the size of the debt load to the target level by the end of the fiscal consolidation period (in our case - at the end of 2020).

Component C reflects further changes of the primary structural balance due to changes in fiscal policy, which introduced before the period of fiscal consolidation, but realized belatedly.

Component D shows the effect of aging on the value of the general government additional expenditures and the structural deficit relative level on the public finances deficit consequently. We used a formula developed by the European Commission [2].

For the medium term sustainability of Ukrainian public finances (calculation of the indicator S_I by 2020) we were systematized following indicators (see. Table 1): public debt, forecast indicators, % of GDP by 2020, according to experts calculations of the IMF [5]; primary balance of the general government by 2020 is presented in the forecast of the IMF for Ukraine, [5]; costs, associated with the aging population, % of GDP [6]; nominal interest debts rate, % by 2020 is presented in the report of the IMF for Ukraine [5]; nominal GDP growth, % and GDP (billions UAH) by 2020 are presented on the official IMF website, which at the time of 2020 will be 4% [5].

As a result we have obtained value of S_I indicator for 2021 - 7,754. Considering the fact that the EU states $S_I > 3$ means that public finances are characterized by a high degree of risk can, we can make a similar conclusion for Ukraine [10].

The value of each component A, B, C and D, make a negative impact on the sustainability of public finances: the greatest impact showed by component A (5,091% of GDP), reflecting the impact of public debt starting level and primary structural deficit in public finances. Component B (1,252% of GDP) showed a cumulative change in structural primary balance - the sum of his annual increases or reductions; this component reflects additional structural burden on public finances. Component C (1,393% of GDP) determines the necessary adjustments in order to reach the target debt level to 60% for 2021 and in this case is characterized by negative effect of changes in tax policy at the level of the fiscal gap. The calculated value of the component D (0,018% of GDP) shows the least impact on the sustainability of public finances in the medium term.

Table 1

Initial data for calculating the S_I indicator in Ukraine

i			-1	0	1	2	3	4	5	6	7
Indicator			2013	2014	2015	2016	2017	2018	2019	2020	2021
	1+r	Period	1,09	1,19	1,17	1,06	1,04	1,03	1,03	1,03	1,03
State debt, % of GDP	D0	2014	40,7	71,2	94,1	92,6	88,9	83,3	77,3	71,0	60,0
Primary balance of the general government	PB0	2014		-1,20	1,10	1,40	1,60	1,60	1,60	1,60	1,60
The costs associated with population aging, % of GDP	PB ageing	At the period	17,7	17,8	17,9	18,0	18,1	18,2	18,3	18,5	-
Costs changes associated with aging	Δ PB ageing i	At the period		0,10	0,10	0,10	0,10	0,10	0,10	0,20	0,10
The nominal debt interest rate, %	R	At the period	8,70	10,70	10,90	7,70	7,40	7,00	6,90	7,00	7,00
Nominal GDP growth, %	G	At the period	-0,03	-6,83	-5,55	1,99	3,53	3,99	3,98	4,03	4,00
GDP (tn UAH)			1,47	1,57	1,85	2,09	2,36	2,63	2,90	3,19	3,32
$\alpha_{i0;t2}$			1,17	1,24	1,29	1,32	1,36	1,40	1,44	1,17	0,10

Source: developed by the author based on [5], [6], [8].

Using data from Table 1, let's calculate the components A, B, C, D and S_I indicator by 2021 (see. Table 2).

Table 2

Formula to calculate the S_I indicator and its components

Indicator S_I	$A_T+B_T+C_T+D_T$
	Components for calculating the S_I indicator
A	$\left(\frac{D0_{t0} \cdot ((1+r)_T) - 1}{\sum_{2015}^T (1+r)} \right) - PBO_{t0}$
B	$PBO_T - PBO_{2015} \cdot \frac{\sum_{2015}^{2021} i_{2021} - i_T \cdot (1+r)_T}{\sum_{2015}^T (1+r)}$
C	$\frac{D0_{t0} - D0_T}{\sum_{2015}^T (1+r)}$
D	$\frac{\sum_{2015}^T \Delta PB_{ageing} i_T \cdot (1+r)_T}{\sum_{2015}^T (1+r)}$

Source: developed by the author.

Conclusions. Considering the global nature and the inevitable aging process, the IMF notes that it is impossible to stop the growth of spending on it; at best it may be able to maintain a stable level of spending (relative to GDP), but this requires urgent and significant structural reforms. These reforms include: the reduction of traditional distributive pension system (Pay-As-You-Go Systems) with the introduction or expansion of private funded pension programs simultaneously. Increasing the retirement age is also an effective measure; according to the IMF, raising the retirement age by one year makes it possible to cover half the projected increase in pension costs

between 2010–2030 years. Among other reforms modifications of pensions calculating formula were specified, changes of the indexation order and pension taxation, implementation of income verification procedures at of public programs pensions. However, you need to determine that the need for such “unpopular” reforms itself is a remarkable challenge for politicians and society in general. On the other hand, the continuation of extensive coverage practice of pension payments in terms of the progressive aging of the population also (although perhaps not so obviously) will lead to lower pensions inevitably.

To solve the problems of public finances sustainability in the medium term and sustainable development of Ukraine it is advisable to use its own system of public finances sustainability evaluation, like existing in the EU states (S_I indicator and model «probit-logit»). In this case, you should consider the features of the financial and economic system of our country. For the unification of public finances sustainability assessment in Ukraine we should solve the problem of information base formation, collecting and processing information – we need to change the requirements for the development and publication of relevant statistical indicators of public finances and methodological support of their assessment.

As a result of our calculation of the S_I indicator by 2020 (at 7,754 level), we concluded a high risk of public finances in Ukraine. Further research in this field can be made with the analysis of long-term prospects, developing suggestions for possible ways in order to improve the public finances sustainability.

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