


SUSTAINABILITY AND SECURITY OF PUBLIC BUDGET OF THE VISEGRAD GROUP COUNTRIES


Andrii Buriachenko

Department of Finance, Kyiv National Economic University named after Vadym Hetman
54/1 Peremogy ave., Kyiv, 03057, Ukraine

 <https://orcid.org/0000-0002-7354-7491>

Kostyantyn Zakhochay

Department of Finance, Kyiv National Economic University named after Vadym Hetman
54/1 Peremogy ave., Kyiv, 03057, Ukraine

 <https://orcid.org/0000-0003-1001-8012>


Anastasiia Liezina

Department of Economics and Entrepreneurship
Kyiv National Economic University named after Vadym Hetman
54/1 Peremogy ave., Kyiv, 03057, Ukraine, liezina@ukr.net

 <https://orcid.org/0000-0003-0516-6598>

Volodymyr Lysak

Department of Management, Kamianets-Podilskyi Ivan Ohienko National University
61 Ohienko Street, Kamianets-Podilskyi, Khmelnytsky Region, 32301, Ukraine

 <https://orcid.org/0000-0001-8469-4166>

Article history: Received 14 December 2021, Received in revised form 26 January 2022, Accepted 26 January 2022, Available online 27 January 2022.

Abstract

The article examines the theoretical principles of studying sustainability and security of public budget of the Visegrad Group countries and determines that indicators of the normal functioning of the economy and ensuring a decent social standard of living of the population are reaching the limits of relevant indicators, some of which are approved by international standards. At the same time, the authors identified the absence of a single system of macrofinancial indicators of sustainability and security of public budget proposing to create it, including twelve ratios reflecting levels of debt security, deficit load on the economy, debt load on the population, budgetary independence, efficiency, population well-being, productivity, economic efficiency, as well as the effectiveness of financial support for health and education, elasticity of income and expenditure from the change in GDP of the Visegrad countries.

Analytical calculations of the above-mentioned macro indicators in the dynamics made it possible to draw qualitative conclusions on compliance with the sustainability and security of public budget of the Visegrad Group countries, identify possible threats to national economies and prevent the consequences in case of non-compliance with standards. Based on the results of correlation-regression analysis, the authors determined the indicators that have the greatest impact on the resultant factor-the ratio of the level of deficit load on the economy of the investigated countries. It made it possible to analyze the real situation in the economy, to determine the level of sustainability and security of public budget and to give the necessary suggestions and recommendations.

Keywords

sustainability and security of public budget; the Visegrad group countries; economic development; macroeconomic analysis.

Introduction

Social - economic development, its key trends and the impact factors in the Visegrad Group countries is the object of high academic interest because of many reasons. Being a former part of socialist area, these countries, (Czech Republic, Slovakia, Poland and Hungary) managed to implement numerous reforms, particularly, economic, medical, educational and territorial, to restore the market economy and achieve the substantial level of social-economic growth and regional development. Thus, their expertise and the achievements in different fields of economy and finance should be precisely examined and analyzed. Different issues of economic and social development

in the V4 countries have been analyzed by a number of scientists, particularly, well-being state Tendera-Właszczuk et al. [1], Nováková et al. [2], institutional and environmental conditions Koziuk et al., public finance Buriachenko et al. [3], quality of life and living conditions Nováková et al. [2], monetary integration Lyzunyun [4].

Meanwhile, such a crucial issue as a sustainability and security of public budget in Vysegrad countries were not examined to the full extent. Nevertheless, it influences many economic and social aspects in a country and is believed to be one of the vital conditions of regional sustainable development and population needs satisfaction.

The aim of this research is to propose the framework of indicators which provide the comprehensive and clear evaluation of sustainability of public budget, to assess the current state of sustainability of public budget in the V4 countries and to define the main factors influencing budget deficit in each V4 country. To achieve these objective statistical methods of regression analyses were applied [5].

Since the term "sustainability" can be considered in different ways both quantitative and qualitative [3,6], it will be used for the objective of this research based on the Cambridge Dictionary definition, namely as "the quality of being strong, and healthy or unlikely to break or fail" [7,8]. This budgetary situation can be achieved if budgetary expenditures are less than a total revenue while the share of non-utilized revenues reaches 60-70% of the total municipal revenue accumulated on its territory. So, sustainability of public budget can be considered under two aspects. Firstly, as an ability of local bodies to accumulate this amount of revenue which covers all the local expenditures and provides balanced budget. Secondly, as an ability of local authorities to provide local population with sufficient social services for the satisfaction of its needs [9,10].

Manuscript "Suggestions for a New Set of Fiscal Indicators" [7] is devoted to the substantiation of four groups of fiscal indicators designed to answer the question: what in the tax system is caused by changes in the economic environment, and what is due to government policy?, is it possible to support the current course of fiscal policy through tax or expenditure adjustments?, what is the impact of fiscal policy on inflation?, which macroeconomic impact makes fiscal policy through deficit and debt financing?!

According to this, sustainability of public budget should be understood as a budgetary situation which provides healthy functioning of a public body, execution of its powers based on the full and opportune budget expenditures, including servicing external and domestic debt [5,11]. Correspondingly, sustainability of public budget of a region presumes the provision of own resources, relies on the structure of financial resources for a municipal development and its dependence on the external funding. Thus, an assessment of sustainability of public budget is to be executed through a framework of indicators that can characterize the structure of financial resources in a region, their amount and stability, as well as the efficiency of corresponding expenditures aimed at a regional sustainable development [12].

The key characteristics used to evaluate sustainability of public budget include first of all the indicators of a budget independence (a budget ability to collect necessary financial resources mostly through tax system self-sufficiently), dependency on transfers and external financing, soundness, tax autonomy and ability, share of equalization transfer in the whole amount of transfers, income/outcome transfers ratio, which characterize mostly the revenue part of sustainability of local budget [13,14]. Some researchers added also the ratios of debt load to these indicators (the ratios of debt load - indicators of a debt structure, a debt servicing, share of account payable in the whole revenues) [15,16] and a budget efficiency ratio (a budget provision of the population, deficit level ratio, a budgetary performance, revenue stability indicator).

Bojarska et al. [17] consider that sustainable development is a global mega-trend in all spheres of life and priority for people all around the world. The implementation of the seventeen tasks of the Concept of "Sustainable Development Goals", which must be completed by 2030, provides the development of an appropriate system of sustainability indicators based on the latest scientific research.

The issues of digital transformation of the sustainable development system in the EU countries, including Visegrad Group, are studying in the works of Esses et al. [18] and Matthes et al. [19]. Thus, researchers emphasize that the evolution of digital transformation poses actual challenges and provides many new opportunities, as well as unique solutions of individual issues for both economic sectors and regions. Authors consider the need of studying the relationship between digital transformation and sustainability in the countries of Visegrad Group.

An important is to accept the offers of Khanova et al. [20] to use certain indicators of sustainable development of the EU countries and Ukraine. The presented methodology of calculating the ratio of economic, social and environmental efficiency formed the basis of system of indicators of sustainability and security of public budget.

Reflecting the state of a local budget, its revenues, independence, reliance on a central budget and inter-budgetary transfers the latest above-mentioned approaches estimate only limited number of expenditures, namely-dept - servicing and gross expenses p.c, [21], In the meantime, it is social services financing and delivery to population as well as regional long-term development should be considered as the main goals of regional budgeting and

its sustainability achievement. From this point of view, the current research proposes to use additional indicators in a sustainability of public budget evaluation which characterize such spheres of public services and budgetary expenditures as education and healthcare system, namely-the indicator of healthcare system financing and education system financing. Besides, two new indicators-elasticity of budget revenues and expenditures-are proposed to use in a sustainability of public budget assessment. Both of them are calculated as the ratios of increment rates of budget revenues/expenditures and GDP and reflect the change of revenues/expenditures in case of 1% change of GDP.

The dynamics of indicators of stability and security of public budget of the Visegrad Group countries is influenced by many factors. Economic growth factors that allow the reviewed countries to develop are GDP, GNI, revenues and taxes of the public budget. They impact on the studied indicators positively, provide an opportunity to improve the standard and quality of life. On the contrary, negative factors (inflation, deficit, public debt, etc.) can have a positive effect only if the thresholds expressed in terms of indicators of stability and security of public budget are met. If the maximum allowable values are exceeded or insufficient, these macroeconomic indicators have a negative impact on the economy of the Visegrad Group countries and may lead to the state's failure to perform its functions, which may bring countries closer to crisis or default.

At the same time some of the indicators being used by other researches were excluded in this research because of their limited efficiency for its goal or overlapping other similar indicators and results overload [16].

Based on this, the assessment of sustainability of public budget in the V4 countries is proposed to execute within the framework of 12 indicators which reflects a budget efficiency, solidity, strength and wealth. This indicators framework will allow to measure a sustainability of public budget in these countries and formulate the qualitative interpretation of the results achieved (Table 1).

Table 1. Sustainability and security of public budget indicators. *Source: Public finances in Euro Area Member States selected indicators.*

No.	Indicators	Recommended limit
1	A debt security, % GDP	up to 60%
2	A budget deficit, % GDP	up to 3%
3	A debt load p.c.	up to 300 USD p.c.
4	Budgetary independence (a share of budget revenues in expenditures)	over 80%
5	Budgetary performance (a share of budget revenues p.c.)	↑
6	A budget provision (a share of budget expenditures p.c.)	↑
7	Budgetary financial performance	↑
8	A budget economic efficiency	↑
9	Healthcare financing share in GDP	over 4%
10	Education financing share in GDP	over 8,3%
11	Revenue elasticity depending on GDP changes	↑
12	Expenditure's elasticity depending on GDP changes	↑

Methods

The macrofinancial indicators of the Visegrad Group countries were collected, processed and analyzed and the methods of economic and statistical analysis were applied for the analytical part of the study. Based on the analysis of relative values, the ratios of stability and security of public budget were calculated and compared with the recommended marginal values of these indicators.

By means of dynamics analysis the values of the investigated indicators were compared over time. Correlation analysis allowed to identify among the set of factors those that mostly influence the effective feature - the value of deficit load on the economy. It should be noted that when the correlation analysis showed an insignificant (low) level of relationship between investigated indicators, such a relationship was not researched in the regression analysis. The regression analysis showed a quantitative measurement of the impact of each factor on the outcome. The values of indicators obtained were summarized and tabulated to demonstrate and formulate conclusions, suggestions and recommendations.

This research is performed using the data, necessary for the calculation of the above-defined indicators of a sustainability of public budget from the V4 countries - Poland, Czech Republic, Slovakia and Hungary (Figures 1-7).

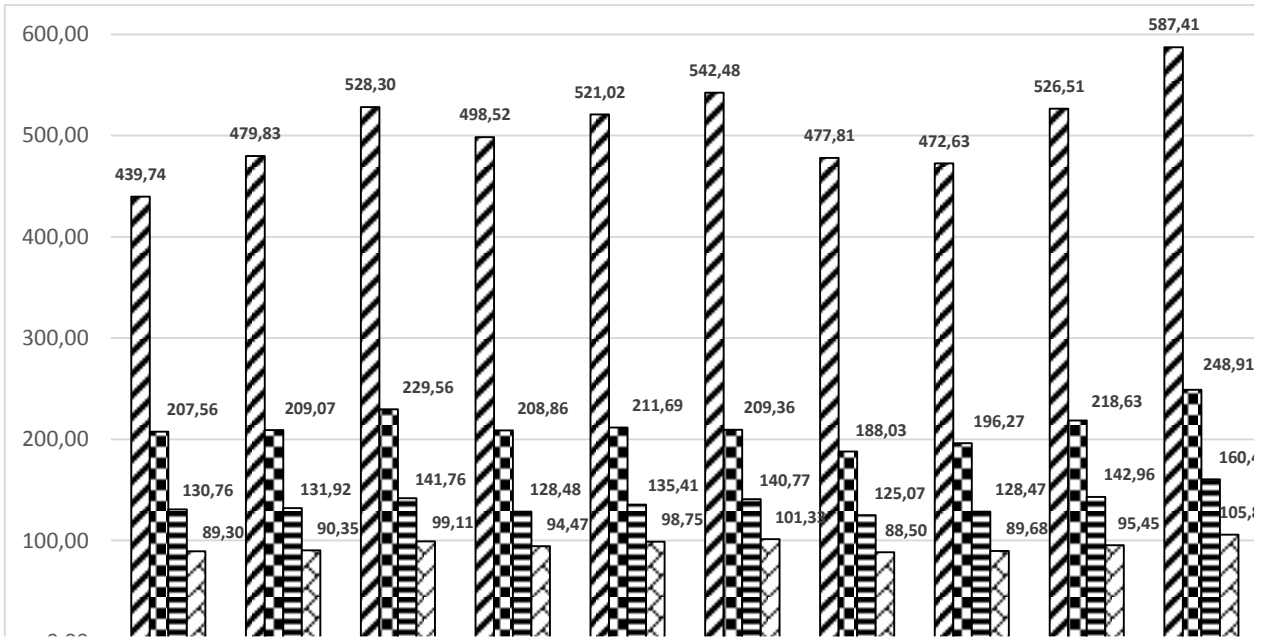


Figure 1. Initial macrofinancial indicators GDP of the Visegrad Group countries, billion USD.

Source: own processing based on data from Visegrad Group.

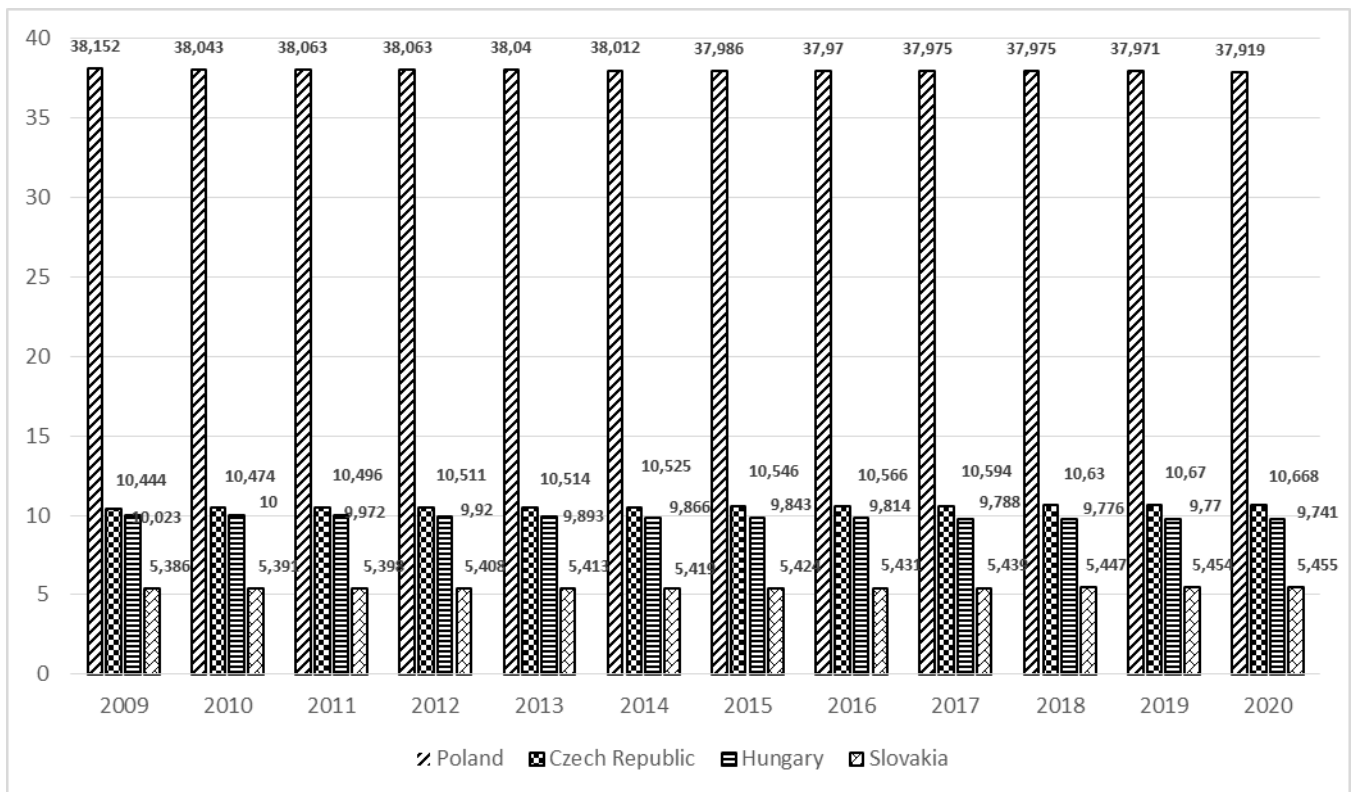


Figure 2. Initial indicators population (P) of the Visegrad Group countries, million people.

Source: own processing based on data from Visegrad Group.

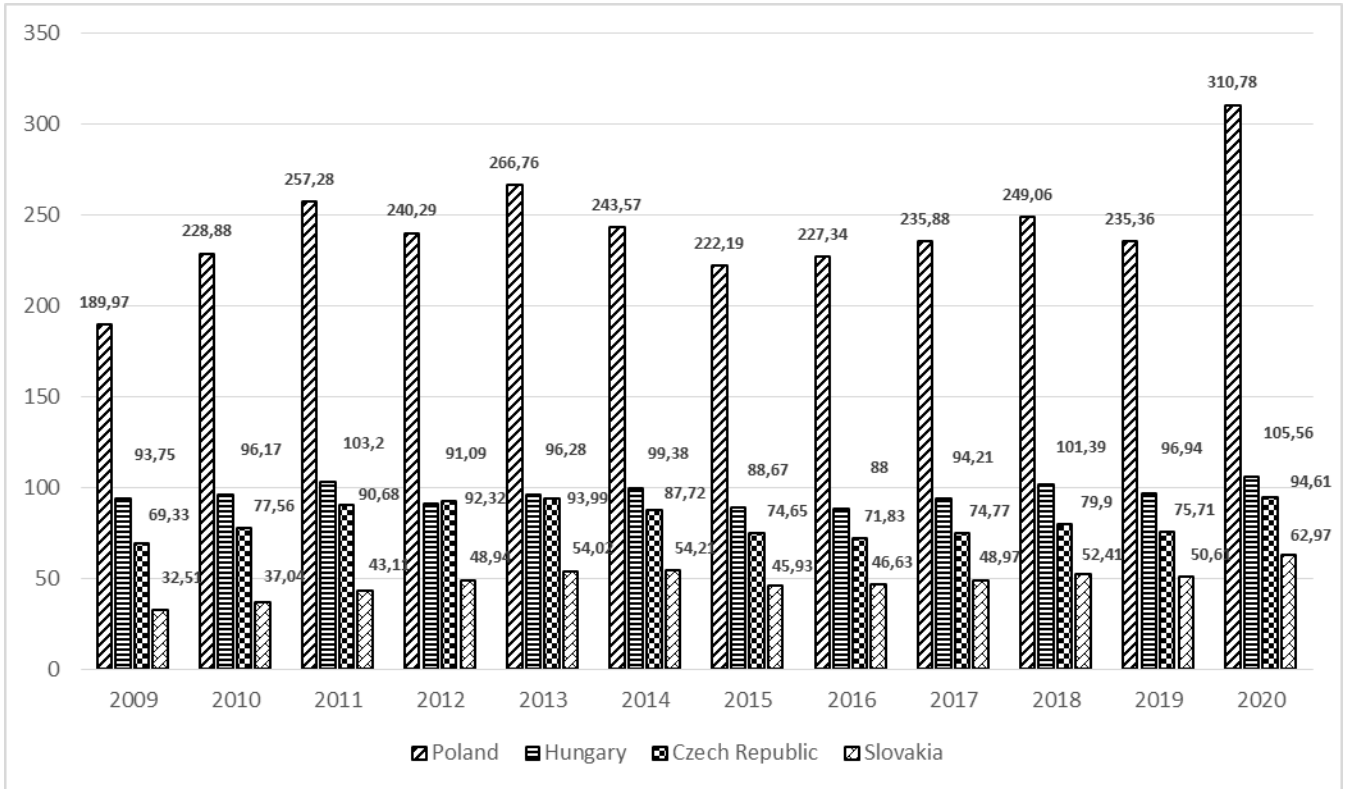


Figure 3. Initial indicators of the total public debt (PD) of the Visegrad Group countries, billion dollars.
 Source: own processing based on data from Visegrad Group.

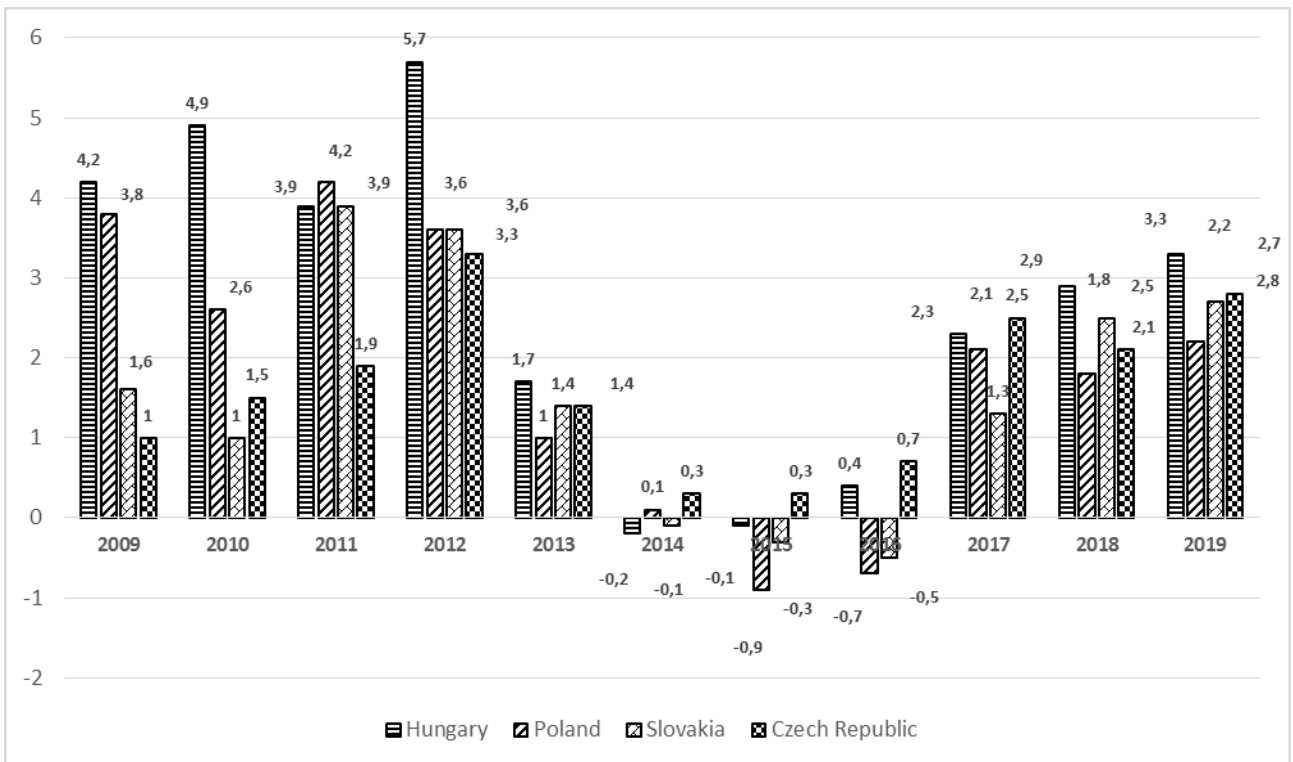


Figure 4. Initial indicators of inflation index (I.) of the Visegrad Group countries, %.
 Source: own processing based on data from Visegrad Group.

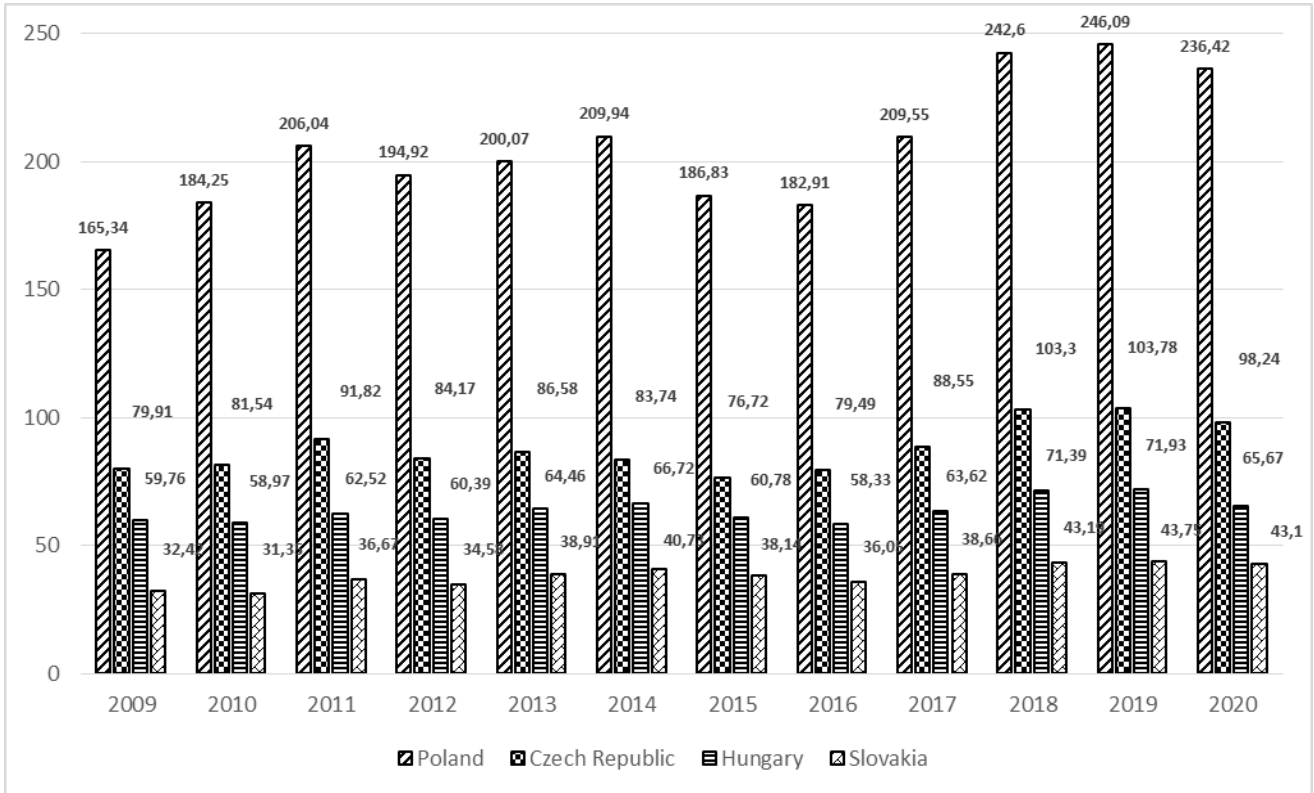


Figure 5. Initial indicators of Income (In.) of the Visegrad Group countries, billion USD.
 Source: own processing based on data from Visegrad Group.

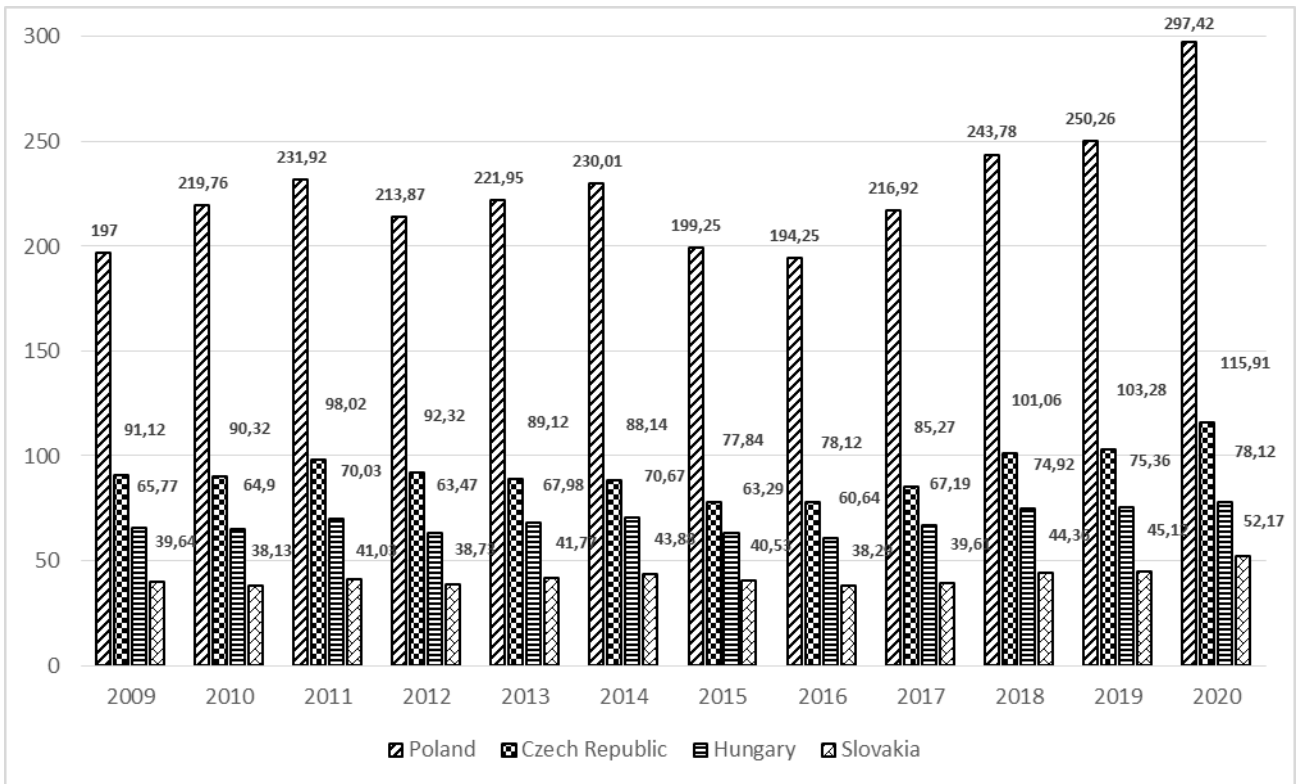


Figure 6. Initial indicators of Expenses (Exp.) of the Visegrad Group countries, billion USD.
 Source: own processing based on data from Visegrad Group.

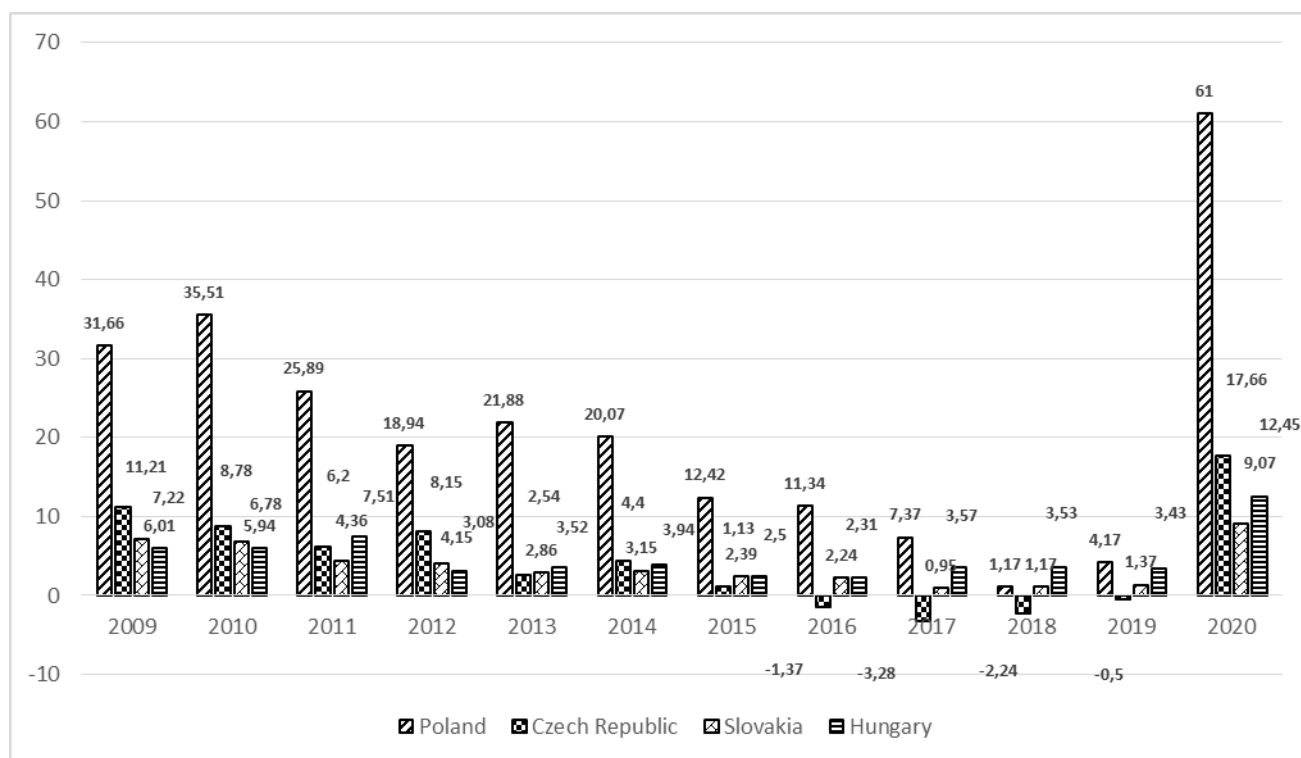


Figure 7. Initial indicators of Deficit (Def.)/Profit (Prof.) of the Visegrad Group countries, billion USD.

Source: own processing based on data from Visegrad Group.

In order to analyze the changes of the factors influencing a sustainability of public budget the research covers the period of 2009-2020. The data was obtained from the financial statements of the V4 countries (Data V4 countries, 2020).

Results and discussion

Sustainability of public budget.

Security of public budget is a component of national security, showing the optimization of the relationship between perceived economic threats and budgetary resources to counter these threats, reflects the state of the economy, which provides sustainable economic growth, effective satisfaction of economic needs, state control over the movement and use of national resources, protection of the country's economic interests at the national and international levels, including territorial unity, state sovereignty, inviolability and budgetary independence.

Security of public budget is one of the main indicators of assessing the effectiveness of public policy to strengthen the social sphere, the state influence on the development of macroeconomic processes such as economic growth, defense, acceleration of scientific and technological progress, radical re-equipment of material and technical base of production, development innovation processes, reducing unemployment, increasing employment etc.

Sustainability of public budget is an economic category that determines the state of the public budget, which ensures the normal functioning of the public authority, the implementation of all its powers based on full and timely financing of budget expenditures, including repayment of external and internal debt. Reflects the state of the totality of monetary funds, in which the state and regions are constantly evolving, ensuring their financial security of the public budget in terms of additional levels of risk.

Indicators of the stability of the state budget of the Visegrad Group.

Calculations of the main indicators of sustainability of public budget and safety are given in Tables 2-13. As the calculations of the debt security ratios of the countries of the Visegrad Group have proved, the excess of debt security norms is observed only in Hungary during the investigated period and in Slovakia in 2020. This situation may cause problems for the country's solvency to meet its payment obligations in full: it indicates inefficient use of internal and external borrowing, inadequate control over this process, cyclical downturns in the economy, high dependence

on imports, and a decline in production. In spite of the low debt security level, it should be noted that until 2019 the situation in Hungary has improved due to the fact that GDP growth rates significantly exceed the national debt growth rate (as proved by the overall decrease of the investigated indicator from 71.70% in 2009 to 59.30% in 2019). Efficient management decisions, namely clear selection of the national debt policy strategy, optimization of the national debt structure and improvement of the level of socio-economic development, are required to ensure the marginal norms of this debt indicator.

In other countries of the Visegrad Group (Czech Republic and Poland), debt security indicators were normal during 2009-2020, in Slovakia - 2009-2019. Their negative trend of growth during 2009-2013 (Czech Republic and Slovakia) and 2009-2012 (Poland) changed for a positive trend of decrease in 2014-2019. These countries manage to serve the national debt through the redistribution of domestic consumer goods to export goods. This means that these countries completely meet their payment obligations and have no solvency problems, which is one of the important indicators of sustainability and security of public budget (Table 2).

Table 2. Dynamics of coefficients of the level of debt security of the Visegrad Group countries.

Source: own processing based on data from Visegrad Group.

Years	Czech Republic			Slovakia			Poland			Hungary		
	PD.	GDP	PD./GDP	PD.	GDP	PD/GDP	PD.	GDP	PD/GDP	PD.	GDP	PD/GDP
	billion USD		%	billion USD		%	billion USD		%	billion USD		%
2009	69.33	207.56	33.40	32.51	89.30	36.40	189.97	439.74	43.20	93.75	130.76	71.70
2010	77.56	209.07	37.10	37.04	90.35	41.00	228.88	479.83	47.70	96.17	131.92	72.90
2011	90.68	229.56	39.50	43.11	99.11	43.50	257.28	528.30	48.70	103.20	141.76	72.80
2012	92.32	208.86	44.20	48.94	94.47	51.80	240.29	498.52	78.20	91.09	128.48	70.90
2013	93.99	211.69	44.40	54.02	98.75	54.70	266.76	521.02	51.20	96.28	135.41	71.10
2014	87.72	209.36	41.90	54.21	101.33	53.50	243.57	542.48	44.90	99.38	140.77	70.60
2015	74.65	188.03	39.70	45.93	88.50	51.90	222.19	477.81	46.50	88.67	125.07	70.90
2016	71.83	196.27	36.60	46.63	89.68	52.00	227.34	472.63	48.10	88.00	128.47	68.50
2017	74.77	218.63	34.20	48.97	95.45	51.30	235.88	526.51	44.80	94.21	142.96	65.90
2018	79.90	248.91	32.10	52.41	105.87	49.50	249.06	587.41	42.40	101.39	160.42	63.20
2019	75.71	250.68	30.20	50.61	105.43	48.00	235.36	595.86	39.50	96.94	163.47	59.30
2020	94.61	241.98	39.10	62.97	101.89	61.80	310.78	580.89	53.50	105.56	149.94	70.40

The rapid increase of ratio value in 2020 in all studied countries was caused by the COVID-19 pandemic, due to the consequences of which there was a shortfall in GDP and a significant increase of public debt, which contributed to exceeding the maximum level of debt security in Slovakia (61.80%) and Hungary (70.40%) and substantially worsened the debt situation in Czech Republic and Poland, despite of the fact that now this ratio in the last two countries is within the normal range.

Ratios of the value of deficit load on the economy of the Visegrad Group countries. During 2009-2019 all the Visegrad Group countries tended to decrease the indicator investigated, that demonstrated an increase in the development level of these countries. In 2009-2012-Czech Republic (5.40% -3.90%), in 2009-2012 and 2014 Slovakia (8.10% - 4.40% and correspondingly 3.10%), in 2009-2014 Poland (7.20% -3.70%), in 2009-2011 Hungary (4.60% -5.30%) had exceeded the limits of security caused by the economic crisis, high inflation rates, the use of most of their resources for current consumption, and the implementation of significant payments by debt obligations.

Access to a safe level in 2015-2019 has been achieved through the implementing active functions of a deficit in the economy - financing national investment programs, gaining more GDP growth and more. As a consequence, it demonstrates the stabilization of the situation and the improvement of sustainability and security of public budget in the Visegrad countries (Table 3).

Table 3. Dynamics of coefficients of the level of deficit leverage for the economy of the Visegrad Group countries.
Source: own processing based on data from Visegrad Group.

Years	Czech Republic			Slovakia			Poland			Hungary		
	Def. (Prof.)	GDP	Def.(Prof.)/GDP	Def. (Prof.)	GDP	Def.(Prof.)/GDP	Def. (Prof.)	GDP	Def.(Prof.)/GDP	Def. (Prof.)	GDP	Def.(Prof.)/GDP
	billon USD		%	billon USD		%	billon USD		%	billon USD		%
2009	11.21	207.56	5.40	7.23	89.30	8.10	31.66	439.74	7.20	6.01	130.76	4.60
2010	8.78	09.07	4.20	6.78	90.35	7.50	35.51	479.83	7.40	5.94	131.92	4.50
2011	6.20	29.56	2.70	4.36	99.11	4.40	25.89	528.30	4.90	7.51	141.76	5.30
2012	8.15	08.86	3.90	4.16	94.47	4.40	18.94	498.52	3.80	3.08	128.48	2.40
2013	2.54	11.69	1.20	2.86	98.75	2.90	21.88	521.02	4.20	3.52	135.41	2.60
2014	4.40	09.36	2.10	3.14	101.33	3.10	20.07	542.48	3.70	3.94	140.77	2.80
2015	1.13	88.03	0.60	2.39	88.50	2.70	12.42	477.81	2.60	2.50	125.07	2.00
2016	1.37	96.27	0.70	2.24	89.68	2.50	11.34	472.63	2.40	2.31	128.47	1.80
2017	3.28	18.63	1.50	0.95	95.45	1.00	7.37	526.51	1.40	3.57	142.96	2.50
2018	2.24	48.91	0.90	1.16	105.87	1.10	1.17	587.41	0.20	3.53	160.42	2.20
2019	0.50	50.68	0.20	1.37	105.43	1.30	4.17	595.86	0.70	3.43	163.47	2.10
2020	7.66	41.98	7.30	9.07	101.89	8.90	61.00	580.89	10.50	12.45	149.94	8.30

However, it should be noted that in 2020 the ratio of this coefficient was the worst in all studying period. So, in all the countries of the Visegrad group, there is a negative trend towards an increase of this coefficient and a significant excess of the limit. This is due to the growth in the budget deficit through an increase in health care expenses caused by the need for additional financing the medical industry in the fight against COVID-19, as well as a fall of GDP.

Ratios of the value of debt load on the population of the Visegrad Group countries. During the investigated period there is a significant excess of the maximum permissible level of debt burden on the population in all the countries of the Visegrad Four: in Czech Republic and Poland, on average-by 23.6 times, in Slovakia-by 29.9 times, in Hungary-by 34.9 times Also, the negative thing is the tendency of increasing this indicator in each country. It means that the debt burden on the population of the countries is excessive, and it affects the general economic and social condition of the people, exacerbates the economic relations between the state and the citizens, creates a threat to sustainability and security of public budget.

In this regard, the governments of the Visegrad Group countries urgently need to take a number of measures to reverse the negative trend, namely, to develop a clear strategy of sustainable (balanced) economic development and to define a wide range of measures to manage national debt, minimizing payments for its servicing, budget deficit, balance of payments, improve borrowed funds efficiency, create new jobs. It will improve the investment climate and raise the living standard of the population while avoiding debt sustainability and security problems (Table 4).

Table 4. Dynamics of coefficients of the level of debt leverage for the population of the Visegrad Group countries.
Source: own processing based on data from Visegrad Group

Years	Czech Republic			Slovakia			Poland			Hungary		
	PD.	P.	PD./P.	PD.	P.	PD./P.	PD.	P.	PD./P.	PD.	P.	PD./P.
	Billon USD	mln. people	USD per person	billon USD	mln. people	USD per person	billon USD	mln. people	USD per person	lon USD	mln. people	USD per person
2009	69.33	10.444	6637.79	32.51	5.386	6035.13	189.97	38.152	4979.23	93.75	10.023	9353.98
2010	77.56	10.474	7405.48	37.04	5.391	6871.36	228.88	38.043	6016.32	96.17	10.000	9616.97
2011	90.68	10.496	8639.12	43.11	5.398	7986.82	257.28	38.063	6759.38	103.20	9.972	10349.11
2012	92.32	10.511	8782.81	48.94	5.408	9048.72	389.84	38.063	10242.04	91.09	9.920	9182.69
2013	93.99	10.514	8939.54	54.02	5.413	9978.99	266.76	38.040	7012.68	96.28	9.893	9731.78
2014	87.72	10.525	8334.62	54.21	5.419	10003.98	243.57	38.012	6407.81	99.38	9.866	10073.34
2015	74.65	10.546	7078.32	45.93	5.424	8468.20	222.18	37.986	5849.04	88.67	9.843	9008.90
2016	71.83	10.566	6798.68	46.63	5.431	8586.56	227.34	37.970	5987.23	88.00	9.814	8966.98
2017	74.77	10.594	7057.91	48.97	5.439	9002.73	235.88	37.975	6211.36	94.21	9.788	9625.12
2018	79.90	10.630	7516.47	52.41	5.447	9621.01	249.06	37.975	6558.57	101.39	9.776	10370.85
2019	75.71	10.670	7095.16	50.61	5.454	9278.77	235.36	37.971	6198.54	96.94	9.770	9921.98
2020	94.61	10.668	8868.97	62.97	5.455	11543.18	310.78	37.919	8195.79	105.56	9.741	10836.44

It is necessary to note that in 2020 the debt burden on the population increased by almost 2,000 USD per year (in Slovakia, the increase occurred by 2,264.41 USD). And this exceeds the maximum permissible rate at about 37 times.

One of the main factors for the worsening of this situation was the financing of the consequences of the COVID-19 pandemic, which influenced both the growth of public debt and increasing the debt burden on citizens.

Ratios of budgetary independence of the Visegrad Group countries. During the researched period, the permissible values of budgetary independence indicators are observed in all the Visegrad Group countries, indicating that they are in compliance with sustainability and security of public budget (except Poland in 2020). Despite the budget deficits that exist in all countries from 2009 to 2020 (except Czech Republic in 2016-2019), the Visegrad countries find an opportunity to cover the difference between expenditures and revenues at the expense of additional sources (mainly their own). It does not prevent the economy from maintaining a stable high level. It should also be noted that there is an overall positive upward trend in fiscal independence (except 2020, when the epidemiological situation affected in a significant decrease in the value of this indicator) (Table 5).

Table 5. Dynamics of coefficients of the budgetary independence of the Visegrad Group countries.
Source: own processing based on data from Visegrad Group

Years	Czech Republic			Slovakia			Poland			Hungary		
	Income	Expenses	In./Exp.	Income	Expenses	In./Exp.	Income	Expenses	In./Exp.	Income	Expenses	In./Exp.
	billion USD		%	billion USD		%	billion USD		%	billion USD		%
2009	79.91	91.12	87.70	32.42	39.65	81.76	165.34	197.00	83.93	59.76	65.77	90.85
2010	81.54	90.32	90.28	31.35	38.13	82.23	184.25	219.76	83.84	58.97	64.90	90.85
2011	91.82	98.02	93.68	36.67	41.03	89.37	206.04	231.92	88.84	62.52	70.03	89.27
2012	84.17	92.32	91.18	34.58	38.73	89.27	194.92	213.87	91.14	60.39	63.47	95.14
2013	86.58	89.12	97.15	38.91	41.77	93.14	200.07	221.95	90.14	64.46	67.98	94.82
2014	83.74	88.14	95.01	40.73	43.88	92.84	209.94	230.01	91.27	66.72	70.67	94.42
2015	76.72	77.84	98.55	38.14	40.53	94.10	186.82	199.25	93.76	60.78	63.29	96.05
2016	79.49	78.12	101.76	36.05	38.29	94.15	182.91	194.25	94.16	58.33	60.64	96.19
2017	88.55	85.27	103.85	38.66	39.61	97.59	209.55	216.92	96.60	63.62	67.19	94.68
2018	103.30	101.06	102.22	43.19	44.36	97.37	242.60	243.78	99.52	71.39	74.92	95.29
2019	103.78	103.28	100.49	43.75	45.12	96.96	246.09	250.26	98.33	71.93	75.36	95.44
2020	98.24	115.91	84.76	43.10	52.17	82.62	236.42	297.42	79.49	65.67	78.12	84.07

Ratios of budgetary performance of the Visegrad Group countries. During the investigated period (except 2020), there has been a positive trend towards an increase in the budget performance indicator in all the Visegrad Group countries: the most rapid shift is observed in Slovakia (by \$ 930.58 per person). It partially compensates for the failure to meet the maximum level of debt load on the population. The results also show that the budgets of the countries researched ensure the proper implementation of their functions, effectively implement state programs and investment projects that promote state development (Table 6).

Table 6. Dynamics of coefficients of the budgetary performance of the Visegrad Group countries.
Source: own processing based on data from Visegrad Group.

Years	Czech Republic			Slovakia			Poland			Hungary		
	Income	P.	Income/P.	Income	P.	Income/P.	Income	P.	Income/P.	Income	P.	Income/P.
	Billion USD	mln. people	USD per person	billion USD	mln. people	USD per person	billion USD	mln. people	USD per person	billion USD	mln. people	USD per person
2009	79.91	0.444	7651.34	32.42	5.386	6018.55	165.34	38.152	4333.78	59.76	10.023	5962.02
2010	81.54	0.474	7784.73	31.35	5.391	5815.52	184.25	38.043	4843.33	58.97	10.000	5896.82
2011	91.82	0.496	8748.48	36.67	5.398	6793.39	206.04	38.063	5413.05	62.52	9.972	6269.17
2012	84.17	0.511	8007.86	34.58	5.408	6393.49	194.92	38.063	5121.02	60.39	9.920	6087.26
2013	86.58	0.514	8234.85	38.91	5.413	7187.79	200.07	38.040	5259.51	64.46	9.893	6515.23
2014	83.74	0.525	7956.67	40.73	5.419	7517.01	209.94	38.012	5522.99	66.72	9.866	6763.12
2015	76.72	0.546	7274.44	38.14	5.424	7032.36	186.82	37.986	4918.23	60.78	9.843	6175.36
2016	79.49	0.566	7523.13	36.05	5.431	6638.07	182.91	37.970	4817.17	58.33	9.814	5943.08
2017	88.55	0.594	8358.05	38.66	5.439	7107.42	209.55	37.975	5518.13	63.62	9.788	6499.51
2018	103.30	0.630	9717.56	43.19	5.447	7930.05	242.60	37.975	6388.42	71.39	9.776	7302.26
2019	103.78	0.670	9726.48	43.75	5.454	8022.27	246.09	37.971	6481.00	71.93	9.770	7362.01
2020	98.24	0.668	9209.21	43.10	5.455	7900.91	236.42	37.919	6234.93	65.67	9.741	6741.99

The negative trend towards a decline in the values of the budget performance ratios in all countries of the Visegrad Group in 2020 was provoked by a significant decrease in budget revenues due to the introduction of a number of tax incentives for businesses that suffer losses due to numerous restrictions and sanctions from the COVID-19 pandemic,

which affected the volume tax revenues and, as a result, led to significant budget losses.

The ratios of security of public budget of the population of the Visegrad Group countries. During the investigated period, there has a positive upward trend of the level of security of public budget in Poland (by \$ 507.94 per person) and Hungary (by \$ 143.05 per person). It indicates that the budgets of these countries are socially oriented, spending on the population is increasing at a faster rate than its size, the financial capacity of the executive authorities is observed, and the level of sustainability and security of public budget is sufficient to finance constitutionally guaranteed measures for the life support of citizens. At the same time, we see a decrease in this indicator in Czech Republic (by \$ 782.47 per person) and Slovakia (by \$ 218.23 per person), which is due to less spending capacity to finance social direction. The governments of these countries in the coming periods should look for additional sources of resource formation to provide wealth to the population (Table 7). COVID-19 pandemic did not affect the positive trend towards an increase in the value of this indicator in 2020. This means that the governments of the Visegrad Four countries continue to increase financing for the social sphere, including additional medical costs.

Table 7. Dynamics of coefficients of the security of public budget of the Visegrad Group countries.

Source: own processing based on data from Visegrad Group.

Years	Czech Republic			Slovakia			Poland			Hungary		
	Expenses	P.	Expenses /P.	Expenses	P.	Expenses/P.	Expenses	P.	Expenses/P.	Expenses	P.	Expense/P.
	billon USD	mln. people	USD Per person	billon USD	mln. people	USD per person	billon USD	mln. people	USD per person	billon USD	mln. people	USD per person
2009	91.12	10.444	8724.52	39.65	5.386	7361.53	197.00	38.152	5163.65	65.77	10.023	6562.14
2010	90.32	10.474	8623.09	38.13	5.391	7072.47	219.76	38.043	5776.68	64.90	10.000	6490.46
2011	98.02	10.496	9339.00	41.03	5.398	7601.25	231.92	38.063	6093.15	70.03	9.972	7022.61
2012	92.32	10.511	8782.81	38.73	5.408	7162.11	213.87	38.063	5618.71	63.47	9.920	6398.10
2013	89.12	10.514	8476.46	41.77	5.413	7716.84	221.95	38.040	5834.77	67.98	9.893	6871.10
2014	88.14	10.525	8374.40	43.88	5.419	8096.68	230.01	38.012	6051.02	70.67	9.866	7162.63
2015	77.84	10.546	7381.42	40.53	5.424	7472.90	199.25	37.986	5245.27	63.29	9.843	6429.48
2016	78.12	10.566	7393.10	38.29	5.431	7050.89	194.25	37.970	5115.91	60.64	9.814	6178.71
2017	85.27	10.594	8048.49	39.61	5.439	7282.91	216.92	37.975	5712.23	67.19	9.788	6864.65
2018	101.06	10.630	9506.82	44.36	5.447	8143.85	243.78	37.975	6419.36	74.92	9.776	7663.27
2019	103.28	10.670	9679.49	45.12	5.454	8273.57	250.26	37.971	6590.85	75.36	9.770	7713.37
2020	115.91	10.668	10865.06	52.17	5.455	9563.28	297.42	37.919	7843.45	78.12	9.741	8019.58

Financial productivity ratios of the budgets of the Visegrad Group countries. It should be noted that the budget productivity ratio increases in Czech Republic (from 28.42 in 2013 to 340.38 in 2016), Slovakia (from 49.42 in 2010 to 96.18 in 2011, and from 21.61 in 2012 to 869.35 in 2015), Poland (from 24.61 in 2010 to 36.06 in 2011, and from 20.01 in 2012 to 812.24 in 2015 and from 102.00 in 2016 to 154.11 in 2017), Hungary (from 19.66 in 2011 to 22.11 in 2012, and from 17.82 in 2013 to 921.62 in 2016). This indicates that these years there has been a positive tendency to increase, which is due to the efficiency of use of budgetary funds, whereby a high level of budgetary potential, targeted use of investments is achieved, social protection of the population is achieved, that in turn influences the development of the economy, that is, promotes to ensure the sustainable development of the Visegrad Group countries. The opposite (negative) situation is observed in other periods, which indicates a threat to the fiscal sustainability and security of the investigated countries in the years of diminishing financial performance ratios (Table 8).

Economic efficiency ratios of the budgets of the Visegrad Group countries. It should be noted that the economic efficiency ratio of the budget increases in Czech Republic (from 69.49 in 2013 to 840.44 in 2016 and from 116.77 in 2018 to 118.12 in 2019), Slovakia (from 142.42 in 2010 to 259.94 in 2011, and also from 59.04 in 2012 to 2017.05 in 2015), Poland (from 64.10 in 2010 to 92.46 in 2011, from 51.18 in 2012 to 2077.33 in 2015, from 263.56 in 2016 to 387.21 in 2017, from 128.95 in 2018 to 135.79 in 2019), Hungary (from 44.57 in 2011 to 47.04 in 2012, and from 37.43 in 2013 to 2030.01 in 2016). It indicates that these years there has been a positive trend to increase, which is due to the efficiency and effectiveness of using budget funds, which allows to achieve the necessary results of socio-economic development of the Visegrad Group countries with minimal spending budget resources. The opposite (negative) situation is observed in other periods, which indicates a threat to the sustainability and security of public budget of the countries investigated in the years of diminishing economic efficiency ratios (Table 9).

Table 8. Dynamics of coefficients of the financial productivity of the Visegrad Group countries. *Source: own processing based on data from Visegrad Group.*

Years	Czech Republic				Slovakia				Poland				Hungary			
	In.	Exp.	I.	C _{fin.pr.}	In.	Exp.	I.	C _{fin.pr.}	In.	Exp.	I.	C _{fin.pr.}	In.	Exp.	I.	C _{fin.pr.}
	billon USD		coefficients		billon USD		coefficients		billon USD		coefficients		billon USD		coefficients	
2009	79.91	91.12	0.010	-	32.42	39.65	0.016	-	165.34	197.00	0.038	-	59.76	65.77	0.042	-
2010	81.54	90.32	0.015	89.48	31.35	38.13	0.010	49.42	184.25	219.76	0.026	24.61	58.97	64.90	0.049	21.35
2011	91.82	98.02	0.019	67.78	36.67	41.03	0.039	96.18	206.04	231.92	0.042	36.06	62.52	70.03	0.039	19.66
2012	84.17	92.32	0.033	45.19	34.58	38.73	0.036	21.61	194.92	213.87	0.036	20.01	60.39	63.47	0.057	22.11
2013	86.58	89.12	0.014	28.42	38.91	41.77	0.014	27.90	200.07	221.95	0.010	25.99	64.46	67.98	0.017	17.82
2014	83.74	88.14	0.003	67.12	40.73	43.88	-0.001	69.66	209.94	230.01	0.001	94.59	66.72	70.67	-0.002	57.74
2015	76.72	77.84	0.003	290.13	38.14	40.53	-0.003	869.35	186.82	199.25	-0.009	812.24	60.78	63.29	-0.001	430.08
2016	79.49	78.12	0.007	340.38	36.05	38.29	-0.005	296.48	182.91	194.25	-0.007	102.00	58.33	60.64	0.004	921.62
2017	88.55	85.27	0.025	161.93	38.66	39.61	0.013	201.90	209.55	216.92	0.021	154.11	63.62	67.19	0.023	262.28
2018	103.30	101.06	0.021	48.46	43.19	44.36	0.025	83.88	242.60	243.78	0.018	53.26	71.39	74.92	0.029	46.19
2019	103.78	103.28	0.028	48.90	43.75	45.12	0.027	39.45	246.09	250.26	0.022	56.08	71.93	75.36	0.033	33.11

Table 9. Dynamics of coefficients of the economic efficiency of budgets the Visegrad Group countries. *Source: own processing based on data from Visegrad Group*

Years	Czech Republic				Slovakia				Poland				Hungary			
	GDP	Exp.	I.	C _{ec.ef.}	GDP	Exp.	I.	C _{ec.ef.}	GDP	Exp.	I.	C _{ec.ef.}	GDP	Exp.	I.	C _{ec.ef.}
	billon USD		coefficients		billon USD		coefficients		billon USD		coefficients		billon USD		coefficients	
2009	6	91.12	0.010	-	89.3	39.65	0.016	-	439.74	197.00	0.038	-	130.76	65.77	0.042	-
2010	209.07	90.32	0.015	229.45	90.35	38.13	0.010	142.42	479.83	219.76	0.026	64.10	131.92	64.90	0.049	47.75
2011	229.56	98.02	0.019	169.45	99.11	41.03	0.039	259.94	528.3	231.92	0.042	92.46	141.76	70.03	0.039	44.57
2012	208.86	92.32	0.033	112.14	94.47	38.73	0.036	59.04	498.52	213.87	0.036	51.18	128.48	63.47	0.057	47.04
2013	211.69	89.12	0.014	69.49	98.75	41.77	0.014	70.82	521.02	221.95	0.010	67.67	135.41	67.98	0.017	37.43
2014	209.36	88.14	0.003	167.80	101.33	43.88	-0.001	173.27	542.48	230.01	0.001	244.41	140.77	70.67	-0.002	121.82
2015	188.03	77.84	0.003	711.10	88.5	40.53	-0.003	2017.05	477.81	199.25	-0.009	2077.33	125.07	63.29	-0.001	884.93
2016	196.27	78.12	0.007	840.44	89.68	38.29	-0.005	737.51	472.63	194.25	-0.007	263.56	128.47	60.64	0.004	2030.01
2017	218.63	85.27	0.025	399.83	95.45	39.61	0.013	498.52	526.51	216.92	0.021	387.21	142.96	67.19	0.023	589.40
2018	248.91	101.06	0.021	116.77	105.87	44.36	0.025	205.59	587.41	243.78	0.018	128.95	160.42	74.92	0.029	103.81
2019	250.68	103.28	0.028	118.12	105.43	45.12	0.027	95.07	595.86	250.26	0.022	135.79	163.47	75.36	0.033	75.24

The ratios of financial support efficiency for health care in the Visegrad Group countries. During the investigated period, all countries of the Visegrad Group observed compliance with the limits of the efficiency ratios of health care financial support. It demonstrates the proper level of funding for the medical industry, which is reflected in the adequate provision of emergency and emergency care to the population of the considered countries, and the healthcare institutions with the necessary modern equipment and facilities (Table 10).

The COVID-19 pandemic, which caused the need to increase healthcare financing in 2020-2021, would certainly affect the corresponding performance indicators, the value of which would increase significantly. The authors believe that the limit of the permissible level of this coefficient for the next years should be set at least at 8% (instead of the currently approved 4%), because the fight against the consequences of the epidemic requires an increase in expenditures in the medical industry at least twice.

The ratios of education financial support efficiency of the Visegrad Group countries. During the investigated period in all countries of the Visegrad Group there was a failure to observe the limits of the ratios of education financial support efficiency. It demonstrates a lack of funding for public and individual training needs, which threatens sustainability and security of public budget. In this regard, the Government should take steps to create conditions for the development of the education sector through additional sources of financing: attracting investors, self-financing, etc. (Table 11).

Table 10. Dynamics of coefficients of efficiency of financial security of healthcare of the Visegrad Group countries, % *Source: own processing based on data from Visegrad Group*

Years	Czech Republic	Slovakia	Poland	Hungary
	Expenses for healthcare/GDP	Expenses for healthcare/GDP	Expenses for healthcare /GDP	Expenses for healthcare /GDP
2009	7.3	7.9	6.6	7.2
2010	6.9	7.7	6.4	7.5
2011	7.0	7.4	6.2	7.5
2012	7.0	7.6	6.2	7.4
2013	7.8	7.5	6.4	7.2
2014	7.7	6.9	6.4	7.1
2015	7.2	6.8	6.4	6.9
2016	7.1	7.1	6.5	7.0
2017	7.2	6.8	6.6	6.8
2018	7.6	6.7	6.3	6.7
2019	7.6	6.7	6.3	6.7

Recommended limit – over 4%

Table 11. Dynamics of coefficients of efficiency of financial support of education of the Visegrad Group countries, %. *Source: own processing based on data from Visegrad Group.*

Years	Czech Republic	Slovakia	Poland	Hungary
	Expenses for education/GDP	Expenses for education/GDP	Expenses for education/GDP	Expenses for education /GDP
2009	4.2	4.0	5.0	5.0
2010	4.1	4.1	5.1	4.8
2011	4.3	3.9	4.8	4.6
2012	4.3	3.9	4.8	4.2
2013	4.1	4.1	4.9	4.2
2014	4.0	4.2	4.9	4.6
2015	5.8	4.6	4.8	4.5
2016	5.6	3.9	4.6	4.7
2017	3.9	3.9	4.6	4.7
2018	3.8	3.7	4.5	4.8
2019	3.7	3.7	4.5	4.8

Recommended limit – over 8.3%

The ratios of income elasticity from GDP show how the income of the Visegrad countries (increases/decreases) as GDP changes by 1%.

- Czech Republic: the largest shift in income due to a change in GDP by 1% is observed in 2014/2013 (with a decrease in GDP by 1%, income decreased by 2.98%); the smallest shift - in 2019/2018 (with an increase in GDP by 1% income increased by 0.66%);
- Slovakia: the largest shift in income due to a change in GDP by 1% is observed in 2016/2015 (with a 1% increase in GDP income decreased by 4.11%) - the situation is negative, as it indicates inefficient mobilization of resources; the smallest shift - in 2020/2019 (with a 1% decrease in GDP, income decreased by 0.45%);
- Poland: the largest shift in income due to a change in GDP by 1% is observed in 2016/2015 (with a 1% decrease in GDP income decreased by 1.93%); the smallest shift - in 2013/2012 (with a 1% increase in GDP income increased by 0.59%);
- Hungary: the largest shift in income due to a change in GDP by 1% is observed in 2010/2009 and in 2016/2015 (with a 1% increase in GDP income decreased by 1.49% in both of the above periods) - the situation is negative, as it indicates inefficient mobilization of resources; the smallest shift - in 2012/2011 (with a 1% decrease in GDP, income decreased by 0.36%).

It should be noted that the shift is positive when GDP increases by 1% the Visegrad Group countries' income grows at a faster rate (more than 1%) (Table 12).

GDP elasticity ratios show how expenditures of the Visegrad countries (increases/decreases), when GDP changes by 1%:

- Czech Republic: the largest shift in expenditures due to a change in GDP by 1% was observed in 2020/2019 (with a 1% decrease in GDP, expenditures increased by 3.52%); the smallest shift - in 2016/2015 (when GDP increased by 1%, expenditures increased by 0.08%);

- Slovakia: the largest shift in expenditures due to a change in GDP by 1% is observed in 2020/2019 (with a 1% decrease in GDP, expenditure increased by 4.65%); the smallest shift in 2017/2016 (when GDP increased by 1%, expenditures increased by 0.54%);
- Poland: the largest shift in expenditures due to a change in GDP by 1% is observed in 2020/2019 (with a decrease in GDP by 1%, expenditure increased by 7.50%); the smallest shift - in 2011/2010 (when GDP increased by 1%, expenditures increased by 0.55%);
- Hungary: the largest shift in expenditures due to a change in GDP by 1% is observed in 2016/2015 (with a 1% increase in GDP, expenditures decreased by 1.54%); the smallest shift - in 2019/2018 (with GDP increasing by 1%, expenditures increased by 0.31%).

Table 12. Dynamics of income elasticity coefficients from changes in GDP of the Visegrad Group countries, %.

Source: own processing based on data from Visegrad Group

Years	Czech Republic			Slovakia			Poland			Hungary		
	R _{inc. Income}	R _{inc. GDP}	Cel. Income	R _{inc. Income}	R _{inc. GDP}	Cel. Income	R _{inc. Income}	R _{inc. GDP}	Cel. Income	R _{inc. Income}	R _{inc. GDP}	Cel. Income
2010/2009	04	0.73	2.80	-3.28	1.18	-2.79	11.44	9.12	1.25	-1.32	0.89	-1.49
2011/2010	12.62	9.80	1.29	16.97	9.70	1.75	11.82	10.10	1.17	6.02	7.46	0.81
2012/2011	-8.33	-9.02	0.92	-5.71	-4.68	1.22	-5.39	-5.64	0.96	-3.41	-9.37	0.36
2013/2012	2.86	1.35	2.11	12.53	4.53	2.77	2.64	4.51	0.59	6.74	5.39	1.25
2014/2013	-3.28	-1.10	2.98	4.70	2.61	1.80	4.93	4.12	1.20	3.52	3.96	0.89
2015/2014	-8.39	-10.19	0.82	-6.36	-12.66	0.50	-11.01	11.92	0.92	-8.90	-11.15	0.80
2016/2015	3.61	4.38	0.82	-5.48	1.33	-4.11	-2.10	-1.08	1.93	-4.04	2.72	-1.49
2017/2016	11.39	11.39	1.00	7.23	6.43	1.12	14.57	11.40	1.28	9.07	11.28	0.80
2018/2017	16.66	13.85	1.20	11.74	10.92	1.08	15.77	11.57	1.36	12.21	12.21	1.00
2019/2018	0.47	0.71	0.66	1.29	-0.42	-3.11	1.44	1.44	1.00	0.76	1.90	0.40
2020/2019	-5.34	-3.47	1.54	-1.49	-3.36	0.45	3.93	-2.51	1.56	-8.69	-8.28	1.05

According to this indicator of sustainability and security of public budget, the situation is positive, as the results indicate the targeted use of budgetary funds (Table 13).

Table 13. Dynamics of coefficients of elasticity of expenditures from changes in GDP of the Visegrad Group countries, %.

Source: own processing based on data from Visegrad Group.

Years	Czech Republic			Slovakia			Poland			Hungary		
	R _{inc. Expenses}	R _{inc. GDP}	Cel. Expenses	R _{inc. Expenses}	R _{inc. GDP}	Cel. Expenses	R _{inc. Expenses}	R _{inc. GDP}	Cel. Expenses	R _{inc. Expenses}	R _{inc. GDP}	Cel. Expenses
2010/2009	-0.88	0.73	-1.21	-3.84	1.18	-3.26	11.55	9.12	1.27	-1.32	0.89	-1.49
2011/2010	8.53	9.80	0.87	7.62	9.70	0.79	5.53	10.10	0.55	7.90	7.46	1.06
2012/2011	-5.82	-9.02	0.65	-5.60	-4.68	1.20	-7.79	-5.64	1.38	-9.37	-9.37	1.00
2013/2012	-3.46	1.35	-2.55	7.84	4.53	1.73	3.78	4.51	0.84	7.10	5.39	1.32
2014/2013	1.10	-1.10	1.00	5.04	2.61	1.93	3.63	4.12	0.88	3.96	3.96	1.00
2015/2014	-11.68	10.19	1.15	-7.62	-12.66	0.60	-13.38	-11.92	1.12	-10.44	-11.15	0.94
2016/2015	0.35	4.38	0.08	-5.53	1.33	-4.14	-2.51	-1.08	2.31	-4.18	2.72	-1.54
2017/2016	9.15	11.39	0.80	3.44	6.43	0.54	11.67	11.40	1.02	10.81	11.28	0.96
2018/2017	18.52	13.85	1.34	11.99	10.92	1.10	12.38	11.57	1.07	11.50	12.21	0.94
2019/2018	2.20	0.71	3.09	1.72	-0.42	-4.15	2.66	1.44	1.85	0.59	1.90	0.31
2020/2019	12.23	-3.47	-3.52	15.61	-3.36	-4.65	18.84	-2.51	-7.50	3.66	-8.28	-0.44

The results of correlation analysis of the studied factors.

Based on the correlation analysis among the complex of investigated factors that can influence the productive feature

- the level of deficit load on the economy, those factors that are characterized by a sufficiently high level of correlation with the specified indicator were selected, that is, for the research the largest factors of influence were selected (those that had little effect on the resultant ratio were not investigated).

Consequently, it was determined that:

- in Czech Republic, the greatest impact on the level of deficit leverage for the economy is made by the indicators of the level of debt leverage for the population, budgetary independence, and the effectiveness of financial support for healthcare - $R^2 = 82.63\%$, respectively, other factors affect by 17.37%;

- in Slovakia, the greatest influence on the level of deficit leverage for the economy is made by the indicators of budgetary independence, budgetary efficiency and effectiveness of financing health care - $R^2 = 99.87\%$, respectively, other factors affect by 0.13%;
- in Poland, the greatest influence on the level of deficit leverage for the economy is made by the indicators of budgetary independence, budgetary performance and efficiency of financial support of education - $R^2 = 99.80\%$, accordingly other factors affect by 0.20%;
- in Hungary, the greatest influence the level of deficit leverage for the economy is made by the indices of the level of debt security budgetary independence and the effectiveness of financial support for healthcare - $R^2 = 99.90\%$, accordingly other factors affect by 0.10%.

To determine the quantitative measurement of the impact of each factor on the productive feature - the level of deficit load on the economies of the Visegrad Group countries, a regression analysis was conducted (table 14), which created basis for constructing regression models (formulas 1-8).

Table 14. Regression analysis matrix to determine the impact of factors on the level of deficit load on the economy of the Visegrad Group countries. Source: own processing based on data from Visegrad Group.

Indicator	Countries			
	Czech Republic	Slovakia	Poland	Hungary
Multiple R (r-correlation ratio), %	90.90	99.94	99.90	99.95
R-squared (determination ratio), %	82.63	99.87	99.80	99.90
Observations (number of investigated periods), p.	10	10	10	10
	Regression ratio			
Y-section (free member, no economic value)	28.49	45.30	48.00	47.50
Debt Security Ratio (DS)	N/A**			0.02
Ratios of the value of debt load on the population (DLP)	0.01	N/A**		
Budget Independence Ratio (BI)	-0.18	-0.43	-0.48	-0.49
Budgetary Performance Ratio (BP)	N/A**	-0.01	0.01	N/A**
Healthcare Financial Support Efficiency Ratio (HFS)	-1.59	-0.27	N/A**	-0.02
Ratio of Education Financial Support Efficiency (FSE)	N/A**		-0.28	N/A**

** N/A - not investigated because of the low level of impact on the productive feature, which was determined on the basis of correlation analysis due to multicollinearity (significant and negligible influence of budgetary stability and security ratios on the level of deficit load on the economy was revealed):

$$\begin{aligned}
 (1) \quad & \text{in Czech Republic:} && Y = 0.01X_1 - 0.18X_2 - 1.59X_3 + 28.49 \\
 & && \Rightarrow \\
 & && P = 0.01DLP - 0.18BI - 1.59HFS + 28.49 \\
 (2) \quad & \text{in Slovakia:} && Y = -0.43X_1 - 0.01X_2 - 0.27X_3 + 45.30 \\
 & && \Rightarrow \\
 & && P = -0.43BI - 0.01BP - 0.27HFS + 45.30 \\
 (3) \quad & \text{in Poland:} && Y = -0.48X_1 + 0.01X_2 - 0.28X_3 + 48.00 \\
 & && \Rightarrow \\
 & && P = -0.48BI + 0.01BP - 0.28FSE + 48.00 \\
 (4) \quad & \text{in Hungary:} && Y = 0.02X_1 - 0.49X_2 - 0.02X_3 + 47.50 \\
 & && \Rightarrow \\
 & && P = 0.02DS - 0.49BI - 0.02HFS + 47.50
 \end{aligned}$$

Consequently, the budgetary independence ratio had the greatest impact on changing the level of deficit load in the economy in all the Visegrad Group countries (except Czech Republic). At the same time, it influenced inversely,

that is, its increase has led to a decrease in the ratio and an increase in the level of deficit load on the economy, which is positive (the limit - no more than 3%). It means that a greater development of the state is achieved when revenues exceed 80% of expenses.

The level of deficit load on the Czech economy is greatly influenced by the effectiveness of financial support for healthcare, which indicates the importance of professional training in medical industry (inverse proportionality), to a lesser extent, the budgetary performance and level of debt leverage for the population. Considering the situation in Slovakia, it should be noted that, in addition to budgetary independence, the ratio of budgetary performance and efficiency ratio of financial support for health care are also affected by the result, and the inverse relationship indicates that the increase of these ratios decreases the resultant index and increases the level of deficit load on the economy. As for Poland, in this country the level of deficit burden on the economy is influenced by the coefficients of efficiency of financial support of education and budget independence (inverse proportionality), as well as budget performance (direct proportionality), in Hungary - the ratios of the level of debt security (direct proportionality), the ratios of budget independence and healthcare financial support efficiency ratio (inverse proportionality).

Impact

It should be noted that in 2020 most of the indicators of fiscal sustainability and security in the Visegrad countries did not reach the required norm or had a negative tendency to decrease. This is a consequence of the fight against the global COVID-19 pandemic. The authors of the article are sure that sufficient financing the healthcare industry, which will make it possible to vaccinate the population and ensure collective immunity, improve the situation and in coming years it will be a positive change in the economies of the studied countries, which can be seen on the results of the corresponding coefficients proposed in this scientific work.

An urgent problem of effective management of the national and regional economies of the investigated countries is the development of a scientifically sound methodology for ensuring sustainability and security of public budget through the identification of mechanisms of imbalance of budgetary processes. Solution to the problem will ensure the efficiency and balance of budgets of all levels, preserving the welfare of the population and a possible breakthrough in the socio-economic development of the Visegrad countries.

Particularly important in the process of ensuring the implementation of the strategy of achieving stability and security of public budget of the Visegrad Group countries is the legal control, which means legislative consolidation and consistent implementation of a legal instrument that enshrines the principles of a system of precautionary measures in the direction of strengthening the budget efficiency, and consists of sections, specifying goals, budgetary interests, economic threats, including their complex monitoring methodology, security criteria and stages of activity towards ensuring fiscal stability and security.

In the authors' view, the strategic vectors for ensuring the stability and security of public budget of the Visegrad country in the current context include: establishing compliance with the rules of budgetary procedures of foreign practice of budgeting, reviewing and approving budgets at all levels; expansion of sources of forming the revenue part of budgets due to the identification of reserves and the use of alternative sources of forming of financial resources; improvement of the budget planning and forecasting system; increase of efficiency of administration and control over spending of budgetary funds; reviewing the parameters of the investigated countries' budgets in the direction of optimization of their revenues and expenditures; improving the system of intergovernmental budgetary relations; prevention of unjustified budget deficits and improvement of deficit financing of state and regional activities.

We believe that the areas of further study in the field of sustainability and security of public budget should be based on applied correlation-regression methods, because in order to achieve a significant level of state development, as a final goal of any government activity, it is necessary to determine the dependence forms of parallel changes of several aggregate features on other features, identify the features of factors' coupling, determine the factors' parameters, directions, density, materiality, as well as evaluate the reliability. Identification of causal relationships at the macro level, which determine the development of the financial system of any country, allows you to interpret the results and develop sound management decisions, which is a necessary prerequisite for effective government.

Conclusions

The study pointed out the analysis of vulnerabilities of the internal and external economy and public finances sectors, as well as risk assessment of public borrowing, based on indicators of fiscal stability and security, are important components of a successful state functioning. Ensuring the sustainable development of the Visegrad Group countries for the successful implementation of fiscal policy is due to compliance with the limits of the above-mentioned indicators.

The results of the analysis showed non-compliance with the limits of fiscal stability and security indicators (when the result of calculating the coefficient is not included in the threshold values) poses threats and additional risks to national economies of the Visegrad Group, which provokes financial instability and economic instability. (debt) crises. The study showed that important components are the analysis of the vulnerability of the internal and external sectors of the economy and public finances, as well as the risk assessment of public borrowing, conducted on the basis of stability and security of the state budget.

We believe that a comprehensive assessment of the budget system of the Czech Republic, Slovakia, Poland and Hungary based on indicators of stability and security of the state budget should help inform investors and creditors about the conditions and prospects of cooperation with the Visegrad region.

The results of the analysis of the relevant indicators will allow to give an overall assessment of the development prospects of the studied countries, to determine their potential budgetary capacity and possible financial risks, to assess the effectiveness of budget management. This will create conditions for dynamic, balanced socio-economic development of the Czech Republic, Slovakia, Poland and Hungary, which will improve the living standards of these countries, ensure compliance with social standards, as well as increase the potential of Visegrad countries, improve management decisions, improve management decisions. functioning of state and local authorities.

These indicators of stability and security of the state budget will demonstrate the level of trust in all authorities, as well as the level of government perception of public needs in general and individual needs in particular.

The authors believe the proposed system of indicators of stability and security of public budget can be supplemented by a number of additional indicators. Thereupon, it is recommended to draw up an appropriate regulatory document that will regulate the budget process, taking into account the approved methodology of sustainability and security. This legislation act shall be binding for budgetary practice and its implementation shall require reporting on the highest level.

Conflict of interest

There are no conflicts to declare.

Acknowledgements

The article will be funded at the author's expense.

References

- [1] H. Tendera-Właszczuk, M. Szymański, Implementation of the welfare state in the Visegrád countries, *Econ. Sociol.* 8 (2015) 126–142. <https://doi.org/10.14254/2071-789X.2015/8-2/10>.
- [2] B. Nováková, V. Šoltés, Quality of life research: Material living conditions in the Visegrad group countries, *Econ. Sociol.* 9 (2016) 282–294. <https://doi.org/10.14254/2071-789X.2016/9-1/19>.
- [3] A.Y. Buriachenko, P. V. Logvinov, Identification of the results of utilization of the performance-based budgeting method in budget process, *Nauk. Visnyk Natsionalnoho Hirnychoho Universytetu.* 2 (2015) 123–129.
- [4] M. Lyzunyzun, Monetary integration of V4 states: experience for Ukraine, in: A. Krysovaty, Y. Savelyev (Eds.), *Econ. Probl. Visegr. Gr. Ctries. Ukr., Ternopil*, 2018: pp. 229–258.
- [5] A. V. Liezina, K.A. Andriushchenko, O.D. Rozhko, O.I. Datsii, L. Mishchenko, O.O. Cherniaieva, Resource planning for risk diversification in the formation of a digital twin enterprise, *Accounting.* 6 (2020) 1337–1344. <https://doi.org/10.5267/j.ac.2020.8.016>.
- [6] O.I. Baranovskyi, Financial security in Ukraine (assessment methodology and support mechanisms), (2004).
- [7] Olivier J. Blanchard, Suggestions for a New Set of Fiscal Indicators, *OECD Econ. Dep. Work. Pap.* (1990).
- [8] C. Hartwell, M. Signorelli, Sustainability of Public Budgets, in: *Palgrave Dict. Emerg. Mark. Transit. Econ.*, Palgrave Macmillan UK, London, 2015: pp. 296–313. https://doi.org/10.1007/978-1-137-37138-6_16.
- [9] D.E. Kozma, Comparative analysis of the sustainable development strategies and indicators of the V4, *DETUROPE.* 11 (2019) 101–120.
- [10] B.S. Schulyuk, Budget risks in the financial activities of Ukraine, *Visnyk ONU.* (2017) 170–174.
- [11] Hungary's new budget, (2019).
- [12] Czech parliament approves 2019 budget, (2019).
- [13] 2020 EU budget, (2019).

- [14] A. Zoppe, L. Navarini, Public finances in Euro Area Member States: selected indicators, 2020. [https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/624406/IPOL_BRI\(2018\)624406_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/624406/IPOL_BRI(2018)624406_EN.pdf).
- [15] Best And Worst States For Financial Security, (2018). <https://www.forbes.com/sites/nextavenue/2014/02/20/best-and-worst-states-for-financial-security/#2ee0466c5f02/>.
- [16] NATIONAL SECURITY SOLUTIONS, (n.d.). <https://www.pgpf.org/finding-solutions/national-security>.
- [17] J. Bojarska, P. Złoty, W.M. Wolf, Life cycle assessment as tool for realization of sustainable development goals-towards sustainable future of the world: Mini review, Acta Innov. 38 (2021) 49–61. <https://doi.org/10.32933/ActaInnovations.38.5>.
- [18] D. Esses, M.S. Csete, B. Németh, Sustainability and digital transformation in the visegrad group of central european countries, Sustain. 13 (2021) 5833. <https://doi.org/10.3390/su13115833>.
- [19] M. Matthes, S. Kunkel, Structural change and digitalization in developing countries: Conceptually linking the two transformations, Technol. Soc. 63 (2020) 101428. <https://doi.org/10.1016/j.techsoc.2020.101428>.
- [20] O. Khanova, I. Matyushenko, E. Kochańska, V. Tretyak, O. Tofaniuk, Calculation of sustainable development index in the eu and ukraine, Acta Innov. 40 (2021) 79–97. <https://doi.org/10.32933/ActaInnovations.40.6>.
- [21] Budget for 2020, (2019) 2020.