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Government Policy on Macroeconomic Stability: Case for Low- and Middle- Income Economies

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Abstract

This study summarizes the existing world experience on scientific and methodological approaches for assessing the macroeconomic stability of the national economy. The systematization of the scientific background allowed concluding the absence of unitized terminological apparatus to define the concept of macroeconomic stability. This study aims to develop the methodology of integrated assessment of the level of macroeconomic stability of the national economy under improving its conceptual bases. The object of this study is country Ukraine, its neighbour countries and countries that have recently joined the EU. For data processing, the authors used the program of statistical analysis Stata 14. The analysis of macro stability indicators was conducted at different stages of the economic cycle: 1) pre-crisis period (2000–2006); 2) crisis period (2007–2010); and 3) the post-crisis period (2011–2017). The authors proposed the methodology for the integrated assessment of the level of macroeconomic stability of the national economy based on the concept of the pentagon model of macroeconomic stability. Therefore, this model considered five main guidelines of state stabilization policy as follows: 1) GDP growth; 2) unemployment rate; 3) inflation rate; 4) external debt; 5) state budget balance. The obtained results of testing the proposed approach for assessing the level of macroeconomic stability allowed concluding that the largest level of decline in the static indicator of macroeconomic stability of the national economy in 2011-2017 was in Ukraine and Serbia. The authors noted that results of this study are considered to be the base for future investigations aimed at improving the conceptual bases of integrated assessment of the level of macroeconomic stability of the national economy.

Keywords: Macroeconomic Stability, Economic Growth, Index of Macroeconomic Stability, Pentagon Model

Introduction

In the conditions of uncertainty and extreme variability, the current trends in the national economy of Ukraine require the identification of qualitative and quantitative criteria of macroeconomic stability of the national economy to timely assess and neutralize the adverse effects of their convergent and divergent influences.

In turn, timely detection of negative trends of the qualitative and quantitative criteria changes of macroeconomic stability allows responding promptly to internal and external shocks and increase the level of competitiveness.

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Moreover, that goes to accelerate economic growth. However, it is essential to select a set of indicators that intimate the level of macroeconomic stability.

According to the image recognition theory, the main requirements for the selection criteria of the set of indicators are:

1. Regulatory and compliance with recognized and adopted regulations, which provide not only the fact of enshrining them in official statistics but also regulatory approval of the methodology of their collection (regardless of whether these indicators are statistics, sociological research or observation materials).
2. The possibility of empirical measurement. Thus, there should be the possibility to quantify the criteria.
3. Have high reactive informativeness, which provides fast and timely information about the activation of possible factors.
4. Have the property of holistic. Herewith, on the one hand, they are self-sufficient for the indicative reflection of a manifestation of a threat. However, on the other hand, in combination with other indicators, they can indicatively reflect another threat occurs that could not be displayed by no single indicator.

However, the systematization of the scientific background allowed concluding the absence of unitized terminological apparatus to define the concept of macroeconomic stability. In turn, it is one of the reasons for the lack of a single accepted by all researchers and experts way to solve the problem of choosing a set of indicators and method of measuring and assessing the level of macroeconomic stability of the national economy.

This study aims to develop the methodology of integrated assessment of the level of macroeconomic stability of the national economy under improving the conceptual bases of integrated assessment of the level of macroeconomic stability of the national economy.

Literature Review

The vast number of scientists devoted investigated the issues on the development, selection of requirements (criteria) for many indicators of estimating the macroeconomic stability of the national economy as the main subject. In turn, Ismihan M. (Ismihan et al., 2005) proposed to assess the level of macroeconomic stability using the unified indicators of inflation, public debt, external debt and exchange rate volatility. In the investigation (Suntsova, 2012) the author proposed to choose the parameters of assessing the macroeconomic stability of the national economy based on evaluating the macro-financial stability of the state and conduct it in the following stages:

1. Polycriteria assessment of the level of socio-economic development.
2. Grouping of key macro-financial indicators.
3. Evaluation of exogenous and endogenous effects.
4. Interpretation of the obtained results and development of recommendations.

The starting basis for the analysis of selected indices is International Financial Statistics (International Financial Statistics), official data of the Ministries of Statistics of a particular country and statistics of central banks of the respective countries (Suntsova, 2012).

In the paper (Radionova, & Malkovskaya, 2017) Radionova I. evaluated the results of macroeconomic policy by deviations from the equilibrium values of macroeconomic variables, which is based on the neoclassical idea of general equilibrium as a result of the interaction of aggregate markets. Moreover, the researcher noted that "the implementation of this approach involves certain stages of analysis as follows: the formation of time series of variables, construction of regression equations and evaluation of their quality, determining the equilibrium values of variables and estimating deviations from the actual values of macroeconomic variables.

Furthermore, the researchers Najarzadeh R. and Shahri V. propose to use the indicator of GDP volatility as an indicator of macroeconomic stability. In the papers (Lyulyov, 2018a; Iqbal, & Nawaz, 2010; Martínez-Vázquez, & McNab, 2006; Wanta, 2018; Lyulyov, 2018b), the scientists used the Misery index, which is the sum of the unemployment rate and the inflation rate, as the main parameters of macroeconomic stability.

Jaramillo L. and Sanchak C. (2007) and Kordos M. (2019), studied the index of macroeconomic instability, which combines inflation, budget deficit, exchange rate volatility, and loss of international reserves.

The scientists Kvasha T. and Stepashko V. proposed to follow the principle of complexity and systematics when choosing a set of indicators. That is, for selecting a system of indicators that comprehensively characterize the state of the system and helps to adjust it based on the formation of various tools and mechanisms (Lyulyov, 2017; Liulov

et al., 2020; Chygryn et al., 2020; Bogachov et al., 2020; Dalevska et al., 2019; Dementyev & Kwilinski, 2020; Dzwigol, 2019a; 2019b; 2020a; 2020b; Dzwigol & Dźwigoł-Barosz, 2018; 2020; Kondratenko et al., 2020; Kwilinski, 2018a; 2018b; 2019; Lakhno et al., 2018; Miskiewicz, 2018; 2019; 2020a; 2020b; Ponomarenko et al., 2018a; 2018b; 2018c; 2019; Prokopenko et al., 2015; 2018; 2019a; 2019b;; Prokopenko & Miskiewicz, 2020; Tkachenko et al., 2019a; 2019e). The authors in the investigations (Bilan et al., 2019a; 2019b; Bublyk et al., 2017; Kotenko et al., 2015; Pająk et al., 2016; 2017) proved that shadow economy and financial stability had negative impact on the macroeconomic stability and economic growth. The authors in the paper proved the linking between macroeconomic stability, innovation development and investment climate in the country (Lyulyov et al., 2017). Thus, the linking among green investment, innovation development (Lipkova et al., 2016) and economic growth as a main indicator of macroeconomic stability was confirmed in the papers (Dkhili, 2018; Lyulyov et al., 2017; Pimoenenko et al., 2018; Pimonenko, 2018; Pimonenko et al., 2017a; 2017b; Masharsky et al., 2018). The scientists in the papers (Harafonova et al., 2017; Boiko et al., 2019; Dzwigol et al., 2019a; 2019b; 2019c; 2020a; 2020b; 2019b; Furmaniak, et al., 2018; 2019a; Kharazishvili et al., 2020; Kwilinski et al., 2019a; 2019b; 2019c; 2019d; 2019e; 2019f; 2019g; Kwilinski & Kuzior, 2020; Kwilinski et al., 2020a; 2020b; 2020d; Miskiewicz & Wolniak, 2020; Saluga et al., 2020; Savchenko et al., 2019; Tkachenko et al., 2019b; 2019c; 2019d; Liubkina et al., 2019) proved that level of macroeconomic stability of the country influenced on the stable development of the industrial sector. In the papers (Kvitka et al., 2019; Dźwigoł et al., 2018) the scientists proved that education, research and development were the core indicators of macroeconomic stability.

In the report on the international experience in calculating macroeconomic indicators and their use, Sanjay Kalre identified the following criteria: 1) indicators should consider the specifics of the country; 2) have a clear economic significance; 3) wide statistical coverage; 4) consider cyclical behaviour (Kalra, 2012).

Methodology

A comparative analysis of the theoretical basis for assessing the level of macroeconomic stability of the national economy showed that using the concept of macroeconomic stability pentagon fully allows meeting the requirement to ensure the reliability of comparisons of different countries and achieve the main goals of stabilization policy.

The director of the Institute of Finance in Warsaw, Professor of Economics Grzegorz W. Kolodko (Kolodko, 1993) proposed a model of the pentagon of macroeconomic stability "Macroeconomic stabilization Pentagon" (MSP). This model is designed to assess the level of economic development, considering internal and external imbalances. The model of the pentagon of macroeconomic stability is based on the calculation of five key indicators that reflect the five signs of macroeconomic stability, viz:

- the growth rate of GDP (r);
- the unemployment rate (U);
- the inflation rate (CPI);
- balance of the state budget to GDP (G).
- balance of current turnover to GDP (CA) (Kolodko, 1993).

The MSP provides the country's achievement under five goals of macroeconomic stability: 1) stable economic growth, measured by the growth rate of GDP; 2) increasing in employment while decreasing in unemployment; 3) increasing the internal balance by reducing inflation rate, 4) providing a balanced state budget, which can support the financing of domestic debt without inflationary effects 5) maintaining the current account balance at a level that allows reducing external debt. The indicators mentioned above represents the apex of the pentagon (Figure 1).

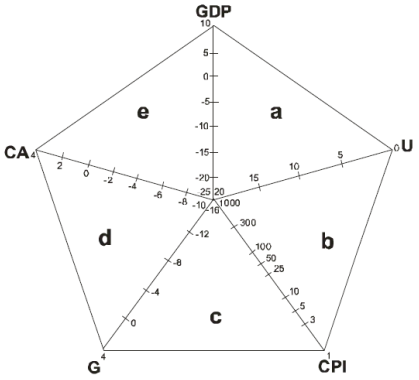

Fig. 1: The Pentagon of Macroeconomic Stability "Macroeconomic Stabilization Pentagon"
Source: developed based on (Kolodko, 1993).

However, the analysis of macroeconomic stability based on the MSP model has a static character. Thus, it does not consider the fluctuations of MSP indicators components and the risks of losing their stability. It should note that the obtained results of the analysis indicated the cyclical interaction and interdependence of indicators of macroeconomic stability of the national economy.

Based on the review of the basic concept of the pentagon model for assessment of macroeconomic stability developed by Gz. Kolodko and modified by K. Zaman and B. Derlik (Zaman, & Drcelic, 2009), G. Hurduzeu and M. Lazar (Hurduzeu, & Lazar, 2015), A. Malina and D. Miersva (Malina, & Mierzwa, 2014), J. Pedraza (Pedraza, 2012), R. Ionita (Ionita, 2015) and others, it follows that the above concepts consider the cyclical fluctuations of indicators for assessing the macroeconomic stability of the national economy.

In this regard, for eliminating the disadvantage, this study proposed a three-step approach to assessing the level of macroeconomic stability of the national economy: 1) Assessment of the static indicator of the level of macroeconomic stability of the national economy for the i-th country (MSi); 2) Evaluation of the cyclic component of the MSc; 3) Assessment of macroeconomic stability of the national economy.

The first stage is to determine the static component of the macroeconomic stability of the national economy based on the modified pentagon model (Zaman, & Drcelic, 2009):

$$MS_i = \sum_{j=1}^{n} A_j = \sum_{j=1}^{n} \left(\frac{X_j - X_{min}}{X_{max} - X_{min..}) \times 10}\right) \quad (1)$$

where A_j – normalized value j-component of the synthetic indicator MS; X_j – real value j-component of the synthetic indicator MS; X_{max} та X_{min} – maximum and minimum values of the synthetic indicator MS.

The maximum level of the static indicator of macroeconomic stability can reach 50. In turn, the value of each sub-index cannot exceed the level of 10. Table 1 presents the thresholds of the static indicator MS.

Table 1: The thresholds of the static indicator MS

THRESHOLDS	LEVELS
MS is (40;50]	the high level of economic stability
MS is (30; 40]	stable economy
MS is (20; 30]	semi-stable economy
MS is (10; 20]	the low level of economic stability
MS ≤10	volatile economy

Source: developed by the authors

The second stage is to calculate the deviations of the actual values variables from the equilibrium ones using the Godric-Prescott filter selecting the cyclic component of each of the elements of the synthetic indicator of macroeconomic stability of the national economy. In turn, the arithmetic means of the standard deviations allows considering the negative deviations of the equilibrium values of the parameters from the optimal value.

It should note that considering the standard deviations of the variables would take into account the negative trends that can be offset by the achieved stabilization of all other components. Moreover, it ensures that all MS components have equal sample volatility. Thus, the most stable components do not exclusively control changes in the index. The mathematical formalization of the calculation of these indicators involves the use of formulas (2; 3):

$$Skewness_j = 100 \times \frac{\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^3}{\left(\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^2\right)^{3/2}} \quad (2)$$

where Skewness – the asymmetry index of the j-component of the macroeconomic stability indicator (MS); x_i – the value of the respective component of the macroeconomic stability indicator (MS) in the i-period; $\bar{x}$ – the average value of the respective component of the macroeconomic stability indicator (MS) for the analysed period; n – the number of analysed periods.

$$Kurtosis_j = 100 \times \frac{\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^4}{\left(\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^2\right)^2} \quad (3)$$

where $Kurtosis$ – the dimension of occurrence of extreme deviations of the j-component of the macroeconomic stabilization indicator (IMS).

Suppose the value of $Skewness$ indicator is close to 0. In that case, it indicates the symmetrical distribution of the j-component of the macroeconomic stability indicator (MS) while the impact of crises or booms would affect its reduction or increase, respectively. In turn, the non-zero value of the asymmetrical indicator (positive or negative) indicates instability. It means the predominance of positive (or negative) shocks.

The analysis of Skewness together with 3 $Kurtosis$ indicators allows completely demonstrate the impact of sharp unusual fluctuations in the country on the components of the macroeconomic stability indicator (MS). Herewith, in the case a symmetrical distribution of the individual components of the macroeconomic stabilization indicator (MS), the $Kurtosis$ indicator is equal to 3 or 300%. The value of more or less than the specified level indicates the tendency of the variable to extreme values. In the frame of the author' approach for assessing the macroeconomic stability of the national economy, it is proposed to calculate the cyclic component by the following formula (4):

$$MS_{cyc_i} = \left(\sum_{j=1}^{n} \sqrt{\frac{1}{T} \sum \left(c_{tj} - mean(c_{tj}) \right)^2} \right) / n \quad (4)$$

where c_t – the cyclic component of the value of the j-element of the synthetic indicator *MS; mean* (c_t) – the cyclic component of the value of the j-element of the synthetic indicator *MS; T=1…t* – period for analysis.

$$c_t = X_t - \tau_t \quad (5)$$

where X_t– the actual data of the value of the j-element of the synthetic indicator *MS*; τ_t – trend component.

The trend component is extracted from the actual data series y_t by solving the expression:

$$\min_{\tau_t} \sum_{t=1}^{T} ((y_t - \tau_t)^2 + \lambda((\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}))^2) \quad (6)$$

The last stage is to calculate the ratio of static and cyclical indicators of macroeconomic stability of the national economy. It allows assessing the conversion of state regulatory policy. Furthermore, for providing a clear idea of the level of macroeconomic stability, it is necessary to conduct a graphical interpretation of the pentagon of macroeconomic stability as well as compare the MS indicator with the sum of standard deviations of MS subindexes considering the distribution asymmetry and extreme deviations.

Results

The first stage of the empirical investigation confirmed the need to consider the cyclical component. In turn, the authors assessed the level of macroeconomic stability of the country using the basic concept of the pentagon for assessing the macroeconomic stability of the country. In this case, the study object is Ukraine, its neighbour countries and countries that have recently joined the EU. For conducting the calculation, it was used the program of statistical analysis Stata 14. Tables 2-4 present the analysis of the MS indicator at different stages of the economic cycle: pre-crisis period (2000–2006), crisis period (2007–2010) and the post-crisis period (2011–2017).

Table 2: MS Index for Low- and Middle-Income Economies (2000-2006 – pre-crisis period)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania
2000	29.78	26.95	29.85	26.35	20.13	24.19
2001	38.19	28.41	31.89	23.15	22.55	28.93
2002	38.63	30.08	34.98	23.38	23.76	30.79
2003	41.36	30.71	38.84	22.69	24.00	32.14
2004	37.94	29.28	35.21	24.98	22.96	36.37
2005	33.05	32.62	36.52	26.13	23.25	32.18
2006	33.17	34.48	34.76	30.78	26.10	35.96
	Bulgaria	**George**	**Moldova**	**Hungary**	**Belarus**	**Serbia**
2000	22.21	24.53	22.03	25.78	32.36	22.40
2001	24.09	29.44	31.55	28.84	31.92	23.66
2002	27.00	26.40	35.11	26.54	34.16	30.04

2003	28.20	31.56	30.17	25.10	35.78	25.84
2004	32.25	28.86	30.06	29.87	41.43	28.53
2005	31.71	35.07	32.44	32.49	43.54	22.44
2006	32.35	36.49	27.42	32.03	45.39	23.08

Source: the authors' calculation

The obtained results (Table 2) indicated the different speed of changes of the macroeconomic stability of the national economy for investigated countries.

Table 3: MS Index for Low- and Middle-Income Economies (2007-2010 – crisis period)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania
2007	29,51	33,05	35,01	33,38	25,46	33,09
2008	19,28	19,62	26,57	29,51	25,30	32,85
2009	20,20	13,70	21,84	24,73	21,05	18,66
2010	25,56	12,75	20,91	23,99	18,57	18,59
	Bulgaria	**George**	**Moldova**	**Hungary**	**Belarus**	**Serbia**
2007	32,58	32,31	26,52	31,24	39,83	23,65
2008	32,44	22,13	32,90	33,50	42,76	24,77
2009	26,67	15,44	22,70	13,75	28,61	17,57
2010	21,03	21,19	28,92	16,09	33,57	14,48

Source: the authors' calculation

Table 4: MS Index for Low- and Middle-Income Economies (2011-2017 – post-crisis period)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania
2011	23,99	24,35	26,21	26,02	18,28	23,72
2012	20,53	26,63	26,88	24,55	17,07	23,54
2013	19,72	27,23	27,87	23,84	16,38	28,98
2014	19,83	25,93	28,78	26,91	17,87	29,74
2017	17,97	26,73	27,93	28,89	19,59	31,40
	Bulgaria	**George**	**Moldova**	**Hungary**	**Belarus**	**Serbia**
2011	25,55	29,50	29,71	22,33	26,78	14,18
2012	24,00	29,30	25,06	27,64	26,45	9,17
2013	23,73	25,69	34,26	22,61	25,55	17,48
2014	23,37	27,36	30,09	22,52	27,95	15,69
2017	27,46	24,79	22,15	20,66	25,76	19,43

Source: the authors' calculation

Therefore, in the pre-crisis period, most countries except Croatia and Serbia showed a stable level of macroeconomic stability. Table 2 indicates that the level of IMS achieved in Ukraine in 2003 was the highest in comparison with other analysed countries and amounted to 41.36. Profiles of macroeconomic stability of the analysed countries are presented in Figures 2-4.

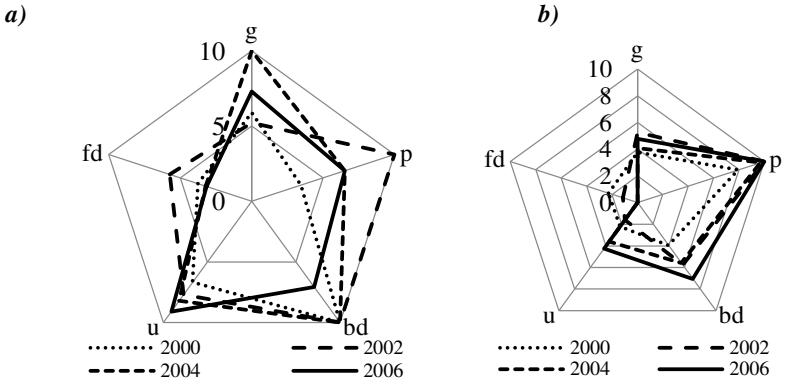

Fig. 2: The Pentagon of the Index of Macroeconomic Stability in *A)* Ukraine and *B)* Croatia (2000-2006)
Source: the authors' calculation

At the same time, for the entire pre-crisis period of 2000-2006, Belarus showed the best dynamics of macroeconomic stability (the level of the IMS indicator increased from 32.36 in 2000 to 45.39 in 2006). It should note that in terms of macroeconomic stability, the best IMS indicator for the entire analyzed period was achieved by Belarus in 2006.

Considering the crisis intensity from 2007 to 2010 through the prism of violating the acceptable range of macroeconomic stability, it is clear that the economies of the investigated countries could be divided into:

- crisis-resistant countries: Belarus;
- countries with moderate resilience to crises: Ukraine, Lithuania, Poland, Bulgaria, Georgia, Moldova;
- countries with low resilience to crises: Latvia, Croatia, Romania, Armenia and Serbia.

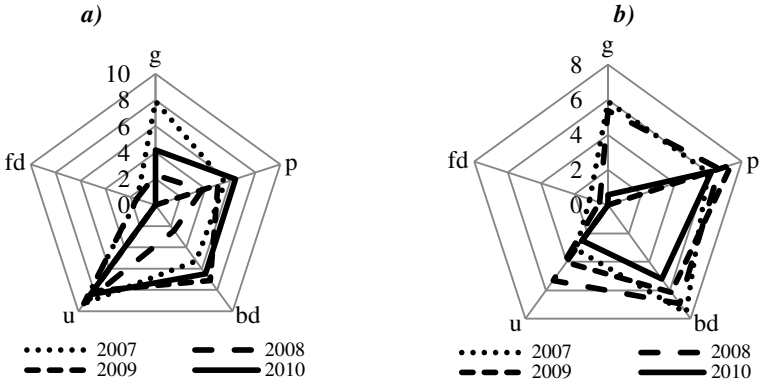

Fig. 3: The Pentagon of the Index of Macroeconomic Stability in *a)* Belarus and *b)* Serbia (2007-2010)
Source: the authors' calculation

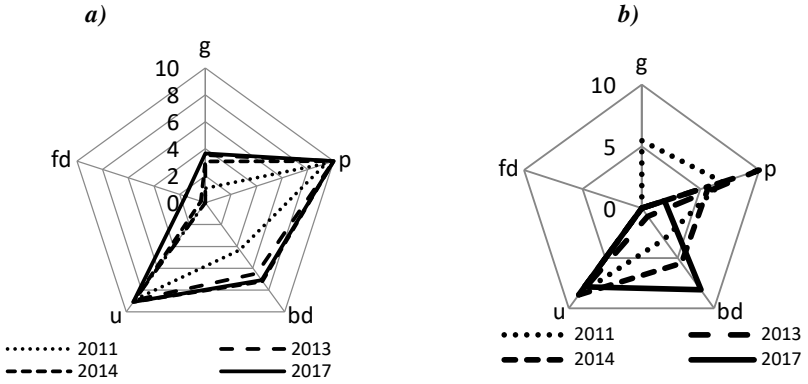

Fig. 4: The Pentagon of the Index of Macroeconomic Stability in *a)* Romania and *b)* Ukraine (2011-2017)
Source: the authors' calculation

Based on the IMS indicator, the comparison of the macroeconomic stability of the European Union was conducted. Therefore, the findings showed that the economies of Latvia, Lithuania and Poland had become more stable every year since joining the European Union in 2004. This situation had been observed until 2008. However, the financial crisis has negatively affected the stability of the economies of the investigated countries. It should note that from 2011 to 2017, Romania, Poland, and Lithuania significantly reduced the gap between IMS values achieved in the pre-crisis period (2000-2006). Besides, this process was the fastest in Romania. Its economy could be described as moderately stable – 31.40. Despite the low level of the IMS indicator in Croatia (in 2015 it was 19.59), the country's economy had been showing a tendency to improve macroeconomic stability significantly since joining the European Union in 2013.

Thus, the largest decrease in IMS from 2011 to 2017 was registered in Ukraine (17.97), Croatia (19.59), Serbia (19.43). Since 2006, the macroeconomic stability of Ukraine has deteriorated. The situation began to change in 2010-2012, but after 2012 macroeconomic stability began to decline significantly and reached its minimum in 2015. Thus, comparing the macroeconomic stability in 2000-2006 with 2011-2017, the area of the pentagon in 2017 reached minimum value (Fig. 4b).

Table 5 indicates the similarity of macroeconomic stability trends for the investigated countries. According to the obtained data, the highest effects of similarity of macroeconomic stability trends were recorded between Lithuania and Latvia (0.89), Georgia and Latvia (0.88), Bulgaria and Croatia (0.8), Belarus and Croatia (0.86). It indicates about almost ninety per cent coincidence economic growth rate. Armenia, Belarus, and Serbia are among the countries with the highest number of positive pairwise correlation coefficients exceeding 0.7. Negative values in the table indicate an inverse relationship. Thus, the upward trend of one country is accompanied by a downward trend of another. The obtained results of macroeconomic stability have shown an imbalance in the shapes of pentagonal surfaces. In turn, it indicates the growth of the main macroeconomic indicators of countries at different rates. Thus, in particular, the highest average GDP growth in 2000-2017 remained at the level of 6.92% of annual growth, which was demonstrated by the Armenian economy. However, despite the peak growth of this indicator in 2003 to 14.04, the total value of IMS was 25.10. It corresponds to a moderately stable economy. Among other EU countries, this result is impressive. However, it should note that it was achieved against the background of low unemployment, which for the period 2000-2005 reached more than 30%. The lowest average GDP growth in 2000-2015 was in Croatia (1.68%). Although, it should note the positive GDP growth in 2015 against the decline in 2009-2014 (approximately -7.4% in 2009 and - 0.4% in 2014). In turn, Croatia, Latvia and Lithuania have experienced the largest recessions. The Latvian economy decreased by 21% in 2008-2010, and the Lithuanian economy - by 12% in 2008-2009. The average GDP growth in Ukraine for 2000-2017 was 4.03% of annual growth. The period of the significant decline in GDP dynamics was 2009 and 2010, by 14.33% and 3.78%, respectively. It is reasonable to note years: 2005, 2006, 2007, when the economy showed growth of the specified indicator at a high level - to 10% a year.

Table 5: Matrix of Paired Correlation Coefficients MS for (2000-2017)

Country	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania	Bulgaria	Georgia	Moldova	Hungary	Belarus	Serbia
Ukraine	1.00											
Latvia	0.55	1.00										
Lithuania	**0.79**	**0.89**	1.00									
Poland	-0.26	0.26	0.11	1.00								
Croatia	0.60	0.40	0.63	0.42	1.00							
Romania	0.42	**0.77**	**0.79**	0.41	0.63	1.00						
Bulgaria	0.28	0.45	0.57	0.57	**0.80**	**0.75**	1.00					
Georgia	0.52	**0.88**	**0.78**	0.26	0.37	0.64	0.44	1.00				
Moldova	0.33	0.20	0.32	-0.31	0.17	0.37	0.15	0.25	1.00			
Hungary	0.42	**0.70**	0.69	0.41	0.63	**0.76**	0.66	**0.70**	0.35	1.00		
Belarus	0.53	0.36	0.57	0.41	**0.86**	0.61	**0.78**	0.46	0.27	**0.71**	1.00	
Serbia	**0.72**	0.45	**0.71**	0.09	**0.80**	0.68	0.59	0.23	0.35	0.51	0.65	1.00

Source: the authors' calculation

It is worth noting that as a result of the financial crisis, macroeconomic stability has deteriorated in each of the analysed aspects. Thus, the high level of unemployment (about 29%) contributed to the deterioration of the situation in Armenia, and the high level of the budget deficit in per cent to GDP (-12%) and external debt (168% of GDP) to the Latvian economy. The highest inflation rate in the period from 2007 to 2010 was in Ukraine. Analysis of the growth rate of inflation in Ukraine economy has indicated a big problem because in the analysed period its level reached double digits. Thus, in particular, in 2015, the inflation rate rose to 48.72. At the same time, as noted in the study (Vasilyeva, 2013), one of the critical factors in weakening the country's economic productivity is inflation. Besides, it is supported by expanding consumer lending to households, which does not correspond to the macroeconomic level of economic development. As can be seen from Table 6, two of the five indicators of macroeconomic stability in Ukraine are distributed with left-wing asymmetry: real GDP (-1.05); budget deficit (-0.26).

Table 6: The Data to Calculate Skewness and Kurtosis (2000-2017)

Country	GDP (%)		Inflation rate (%, a.a.)		Budget deficit (% to GDP)		Unemployment rate (%)		External debt (% to GDP)	
	S	***K***	***S***	***K***	***S***	***K***	***S***	***K***	***S***	***K***
Ukraine	-1.05	3.27	1.58	5.43	-0.26	2.05	0.69	2.71	0.98	3.73
Latvia	-1.38	4.66	0.97	3.22	1.70	4.75	0.20	2.41	-0.18	1.70
Lithuania	-2.21	8.48	0.80	3.02	1.16	3.08	-0.27	2.06	-0.17	1.49
Poland	0.25	2.41	0.71	3.72	0.25	2.14	0.36	1.45	0.12	1.39
Croatia	-0.98	3.40	0.21	2.57	-0.38	2.20	-0.26	2.43	-0.27	1.73
Romania	1.00	1.00	-1.47	2.56	-1.82	3.92	-1.07	1.20	-1.00	1.00
Bulgaria	-0.77	2.85	0.25	2.49	-0.11	1.96	0.31	2.25	-0.31	1.86
Georgia	-0.39	3.30	0.13	2.59	1.35	5.04	0.16	1.99	-0.24	3.13
Moldova	-1.25	3.82	0.20	2.11	0.68	3.62	-0.37	1.90	1.19	3.56
Hungary	-1.55	5.84	-0.16	1.94	1.21	3.71	0.31	1.52	-0.13	1.54
Belarus	-0.51	2.45	1.87	5.02	0.25	2.17	0.65	1.99	0.40	1.61
Serbia	-0.29	2.00	3.27	12.48	0.18	1.94	-0.21	1.96	-0.28	1.69

S – Skewness; K – Kurtosis
Source: the authors' calculation

However, the most significant negative impact on macroeconomic stability has the indicator of real GDP, because the value of the asymmetry coefficient, which is less than 0.5, can be ignored (Kolodizev & Maksimova, 2016).

Table 7: The Data to Calculate the Cyclical Component MS_c (2000-2017)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania	Bulgaria	Georgia	Moldova	Hungary	Belarus	Serbia
2001	5.620	0.896	0.979	2.444	1.430	1.973	2.202	0.954	5.296	1.600	8.735	13.53
2005	6.163	2.198	2.559	2.306	2.115	3.353	4.183	4.100	6.112	4.692	8.818	11.57
2009	6.080	4.042	4.795	2.430	3.057	4.025	5.135	5.524	5.957	6.727	7.817	9.229
2014	5.683	3.435	3.557	2.268	2.926	4.051	4.416	4.856	5.084	5.758	8.859	7.760
2017	7.064	3.432	3.491	2.233	2.987	4.218	4.491	4.946	5.290	5.735	8.689	7.583

Source: the authors' calculation

In addition, it is appropriate to emphasize the presence of right-side asymmetry (Table 7) of each of the indicators of macroeconomic stability in Poland. In turn, it indicates a high probability of favourable deviations in the future.

At the next stage, for considering the negative deviations of equilibrium values of parameters from their optimal value deviations of actual values of variables from equilibrium are calculated.

It should note that low values of the ratio of static indicator MS with the sum of standard deviations of cyclic components of its subindexes indicate a high risk of losing macroeconomic stability and low synchronization of regulatory policies in its main areas (Table 5).

The most considerable level of decline in the static indicator of macroeconomic stability of the national economy from 2011 to 2017 was in Ukraine and Serbia.

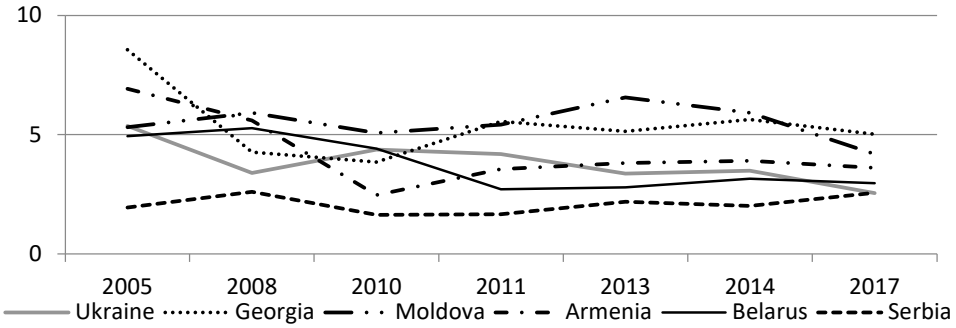

Fig. 5: The Calculation of the Level of Macroeconomic Stability for Ukraine, Georgia, Moldova, Armenia, Belarus and Serbia

Source: the authors' calculation

The level of macroeconomic stability of the national economy in Latvia, Lithuania, and Poland has been growing every year since they became the EU members until the crisis of 2008. Besides, Romania, Poland, and Lithuania significantly reduced the gap between macroeconomic stability of the pre-crisis levels in 2011–2015, where this process was the fastest in Romania.

Despite the low entry-level of macroeconomic stability of the Croatian national economy after joining to the EU, the dynamics of its macroeconomic stability has gained momentum.

Therefore, the low level of standard deviations of the cyclical components of macroeconomic stability of the national economy for the EU countries indicates the effectiveness of the conversion of the state policy of these countries on macro stabilization.

Conclusions

The empirical results of this study confirmed the need to consider not only static but also cyclical components for evaluating the level of macroeconomic stability of the national economy. In this regard, the conceptual framework for integrated assessment of the level of macroeconomic stability of the national economy has been improved.

The authors proposed the methodology of the integrated assessment of the level of macroeconomic stability of the national economy. Unlike the existing ones, this methodology based on the concept of the pentagon of macroeconomic stability and consider five main guidelines of state stabilization policy: GDP growth, unemployment, inflation, external debt, state budget balance. Besides, it systematically combines the static component of macroeconomic stability of the national economy and its cyclical component. Moreover, it allows assessing the conversion of state regulatory policy to achieve macroeconomic stability of the national economy. The results of testing the proposed approach to assessing the level of macroeconomic stability showed that the largest level of decline in the static indicator of macroeconomic stability of the national economy in 2011-2017 was in Ukraine and Serbia.

It is determined that the level of macroeconomic stability of national economies of Latvia, Lithuania, Poland has been growing annually since their joining to the EU before the crisis of 2008. Besides, Romania, Poland, and Lithuania significantly reduced the gap between macroeconomic stability of the pre-crisis levels in 2011–2015, where this process was the fastest in Romania. Despite the low entry-level of macroeconomic stability of the Croatian national economy after joining to the EU, the dynamics of its macroeconomic stability has gained momentum. It is established that the low level of standard deviations of cyclical components of macroeconomic stability of the national economies of the EU countries indicates the effectiveness of the conversion of public policy of these countries on macro stabilization.

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